The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XXXVIII. April 23, 1938 No. 982

Electrochemical Industries in Great Britain

SOME forty years ago a carbide factory was established at the Falls of Foyers in Inverness-shire. Whether this was operated by water power or not we have no record; presumably it was. Foreign competition closed the factory after a brief life of some two or three years. The British chemical industry had anticipated that the example of the British Aluminium Company would be followed by other electrochemical industries, notably by the manufacture of calcium carbide at Corpach. Parliament in its wisdom has, however, negatived the scheme for the third time.

It is instructive to summarise the debate to see what arguments were advanced on either side; perhaps that is the simplest way of forming an opinion of the wisdom or otherwise of the decision. Against the Bill were arrayed the Inverness Town Council, " almost every society in Scotland which desires the preservation of the beauty of the Highlands " and the Scots Self-Government League. Inverness complained that the scheme would divert the waters that now flow east from Loch Quoich by an average of 15 per cent. over the year and this would be serious because without spates and floods to clear the river the city's health would be seriously affected, since the town sewage is disposed of by discharging it into the river. It was calculated by experts that the same quantity of power could be got by using the flow of water eastwards, i.e., without diversion, and, a figure obtained from Sir Alexander Gibb, that current at 100 per cent. load factor could be obtained from coal for 0.185d. per unit as compared with 0.24d. said to be estimated from Loch Quoich. Hence the present scheme, even if the manufacture of carbide was essential, could be rejected on these technical grounds. Severe criticism was also levelled against the proposals on the ground that it was wrong to give the water to private companies to be used for private gain, and that no rating assistance should be given to the company as was proposed for a limited period. Grave fears were entertained that the beauty of the place would be spoilt and that tourists would be driven away.

Before summarising the arguments in favour of the Bill, it will be well to quote Mr. Boothby's statement as to its ultimate objective. " It is," he said, " nothing less than the establishment of electrochemical industries in the Highlands of Scotland worked by hydroelectric plant. At the present time the annual importation into this country of the products of these electrochemical industries is valued at not less than £2,000,000 sterling." Sir Thomas Inskip stated that it was proposed to make carbide and ferro-alloys. We use 60,000 tons of carbide each year, 18,000 tons of ferro-chrome, and 37,000 tons of ferro-silicon. Carbide needs 4,000 units per ton and ferro-alloys from 4,000 to 18,000 units, and only by the Corpach hydroelectric scheme could ferro-alloys be made because the true figures were that the cost of generating current at Corpach would be 0.12d. a unit and in South Wales 0.165d.; this latter figure is understood to be dependent on using Welsh anthracite duff, and takes no account of the increasing cost of coal. The Welsh plant is being erected, but the economics of the scheme depend on both plants, since the cheaper Corpach production would subsidise the Welsh plant. It is therefore a serious matter that the remunerative half of the scheme has been rejected. The last rejection of the Bill was for the specific purpose of allowing a sub-committee of the Committee of Imperial Defence to examine the proposal, and that Committee *has now given the scheme its approval.*

Sir Thomas Inskip would not admit the argument that the scheme would interfere with the sewage disposal of Inverness and he showed that the town sewage was unhygienic by modern standards and should be rectified. It was shown that the generation of current by the eastward flow of the river would be impossibly expensive, and that the westward scheme would mean the submersion of only an additional 400 acres. Many speakers agreed that the modern, properly designed hydroelectric power station did not spoil the countryside and that the scheme would have no effect either on the natural beauty of the scenery nor on the tourist traffic. The few men required to operate the power station would be a positive asset in time of war, a point that the Falmouth committee has recently emphasised in another connection. The method proposed, by which the rights were granted to a private company, sets up no new principle in Scottish hydroelectric development, and there would be a positive gain because the company would be compelled to supply current at cost price to the local residents and to any light industries that may be started in the district. It was stated without contradiction that the whole of the people in the West of Scotland were in favour of the scheme.

It seems that by the rejection of this Bill on the grounds of fear lest natural beauty should be spoilt and the desire of the town of Inverness for a periodic flood to carry away its sewage, there has been lost the chance of establishing important electrochemical industries, and of bringing industry into this depressed area. What this might mean may be seen from a letter read in the debate from Mr. B. N. Peach, B.Sc., M.Inst.C.E., O.B.E.: " A community covering an area of over 200 sq. miles has changed from a state of penury and comparative hardship to happy security by the introduction of the aluminium industry; the outlook of the people has widened to a remarkable degree until to-day they are the most truly alive in the Highlands."

Notes and Comments

Geographical Distribution of Raw Materials

PROBABLY the most potent factor contributing to a general state of international unrest is based on the uneven geographical distribution of the raw materials of industry, with countries making every endeavour to render themselves as self-sufficient as possible. A thorough review of the situation was given in the report of the Raw Materials Committee of the League of Nations, issued last autumn, but with little in the way of constructive plan for improving the position. The van Zeeland report strongly recommended the increase of flow of international trade by means of agreements between countries, and since the report was published, more than one major agreement has been signed. Some progress is thus being made in the solution of the problem of raw materials accessibility and supply. But any progress must necessarily be slow. The whole question is so wide in its scope and complicated in its many ramifications, the stubborn dog-in-the-manger attitude of the " have " to the " have-nots " being most difficult to overcome. However, it was evident from the debate in the House of Lords last week that the Government was energetically working towards the foundation of a stable structure of international economic well-being.

The Control Laboratory

IN the chemical industry, the control laboratory is a most necessary part of the industrial organisation, acting as a guide to efficient manufacturing. L. W. Bass, of the Mellon Institute of Industrial Research, outlined the functions of the laboratory in a paper read this week at a meeting of the division of Industrial and Engineering chemistry of the American Chemical Society. The functions ordinarily comprise the systematic determination of the quality of raw materials and of finished products and the checking of steps in processing. The laboratory is also an aid to effective salesmanship by instilling confidence in the quality of the product, by scientifically investigating complaints, by answering purchasers' inquiries, and by surveying the position of competitive products. It provides data of fundamental importance in research work and can draw up specifications for raw materials as an aid to good purchasing. The laboratory can serve a useful purpose in matters less directly technical, such as cost accounting processes and chemical book-keeping. These are of assistance to the accurate accounting of the whole concern.

Australia's Good Trade Year

FROM the point of view of production, and income from production, the year ended November last has been one of the best that Australia has enjoyed for a long time, according to a report on the economic and commercial conditions in the country, published by H.M. Stationery Office. The progress of manufacturing industries has been remarkable and extensions of industries, either by enlargement or by installation of new plant, have been numerous. External trade is shown to be in an extremely satisfactory position at the end of the year 1936-1937, with a total balance of trade " favourable " to Australia of no less than £35,657,000, compared with a balance of £23,605,000 in 1935-6. There was a moderate increase in imports of merchandise, the United Kingdom's share rising to 41.9 per cent. from 39.7 in the previous year. Total imports in the class drugs, chemicals and fertilisers, rose by about £150,000 to £4,520,236, but the United Kingdom share dropped slightly from 43½ per cent. to 42 per cent. Among the chemicals in which severe competition is experienced from other countries are acids, cements and prepared adhesives, arsenic salts, hydrosulphites, insecticides and disinfectants, potassium salts, sodium acetate, phosphate and sulphate, benzol, bromine and bromides, acetone, calcium acetate, and carbon tetrachloride. The report states that no appreciable increase in Australian total import trade can be expected and if United Kingdom firms are to increase their trade, it must therefore be chiefly at the expense of other competitors.

Utilisation of Molasses

EFFORTS are being made in India to find new uses for molasses, a by-product, at present of little value, of the sugar industry, one of India's major enterprises. In our issue of April 9, experiments for converting the product into a cheap road-surfacing material were described. It is now learnt that investigations are being made to ascertain whether molasses would provide an effective medium for water-proofing channels. Laboratory experiments are understood to have given very satisfactory results and it is proposed to extend them to the field. Further, Dr. N. R. Dhar, until recently head of the Chemistry Department of the University of Allahabad, has shown that molasses can be converted into useful agricultural manure, and a scheme has been developed for commercial production.

" Are We Downhearted ? "

SIR ERNEST BENN has put into words what a good many people must have been thinking about the propaganda for A.R.P. In a letter to *The Times* he asked whether those who were campaigning for A.R.P. were not inclined in their spendid enthusiasm to over-emphasise the element of fear. He recalled from personal experience difficulties which had to be faced during the Great War, particularly in the East End of London, but denied that even in the most intensive period of air-raiding the nation was ever troubled with fear. " All wisdom," he wrote, " dictates that we should adopt every precaution against the terrors of the air, but truth demands that, in doing so, we should not allow the foreigner to imagine that we are afraid. We have not yet lost all those qualities summed up in the slogan ' Are we downhearted?' " There is clearly only one answer.

Safety Education

SPEAKING at the Industrial Safety Conference held at Oxford by the National Safety First Association, Mr. B. L. Lelliott made the point that just as much care and attention must be given to the safety education of those working on or near a machine as to the machine's fencing and guarding. Over 75 per cent. of industrial accidents have nothing whatsoever to do with machinery; most of them are due to failings on the part of the human factor. Carefully planned accident prevention schemes which solicit and maintain the interest of every person in the factory are essential. For any such scheme to be successful, interest must be taken and shown by those in executive positions. It is of vital importance that they should be provided with carefully selected, up-to-date information on safety by the safety organiser. The next problem is to educate the man in the works. Posters are the most popular medium for propaganda. Some form of competition is, in Mr. Lelliott's opinion, the best way of soliciting the interest of all grades of employees.

Cements and Putties for Chemical Works' Use

By
A. G. WRIGHT

CEMENTS and putties which provide good resistance against the corrosive action of acids, and against the penetrating effect of solvent liquids and vapours, are needed at nearly all chemical works. They may be used in the actual construction or erection of parts of the plant for the purpose of making effective joints between metals and non-metals, or used as temporary means for stopping leakage which may occur from a variety of circumstances such as mechanical injury or continuous corrosion. The need for some of these cements and putties becomes especially evident when it is remembered that constructional materials for chemical plant are now diverse in character, and it is often necessary to make a liquid-tight or vapour-tight joint between two parts of the plant which are made of different materials, or materials which are themselves not easily connected one piece to another. If all chemical plant was constructed of iron and steel or some other metal, the use of special cements and putties would be largely confined to temporary means of repair against leakage or assistance in making good screwed and flanged joints.

The term "cement," from a chemical plant aspect, is applied mainly to those compositions which will provide relatively permanent joints; "putties," or "lutes" as they are sometimes called, give a joint which is more temporary in character, as demanded in quick repairs or where a joint may have to be broken on some future occasion without the least possible risk of damaging the two parts of the plant which are connected.

Typical Applications of Cements and Putties

Typical applications of cement occur in making joints between acid-resisting masonry, for fixing acid-proof tiles as an internal lining to a concrete structure or a large metal vessel built in sections, and for providing a continuous acid-resisting surface on equipment which is in contact with corrosive chemicals. The sealing of the annular space in the upturned bell of each section of a stoneware absorption tower, as erected, is a typical application for one of the putties or lutes, the use of a semi-plastic material being desirable in order that the tower may be dismantled for the purpose of inspecting or replacing the internal tower filling or where it might be necessary to dismantle the tower and re-erect it at another point in the works without damage. If a cement with a rigid set was used in this case it would have to be chipped from each upturned bell joint with a very large risk of injury to each of the tower sections concerned. The putties are likewise used for making joints in socketed stoneware pipes. There are, of course, particular border-line cases where special circumstances have to be taken into account in deciding if the jointing material should be somewhat plastic rather than rigid. For instance, in fixing acid-proof tiles inside a large steel or cast iron vessel, which is to be heated intermittently to the boiling point of the acid charge, it would be desirable to use a semi-plastic composition between the tiles and the metal shell, owing to the different rates of expansion which exist for metal and non-metal parts of the construction.

Many chemical plants have an unfortunate way of developing cracks and crevices which give rise to leakage and consequent loss of valuable products. A good knowledge of the limitation and methods of application of chemical plant cements and putties is therefore desirable from a general maintenance aspect as well as for temporary repairs. The number of compositions which can be mixed to meet various needs is a large one, and successful use demands care in preparation and application. In nearly all cases the ultimate success and permanence of the joint over a long period of time will depend very largely upon the method of mixing and applying the cement or putty, and upon allowing sufficient time to pass before the joint comes into contact with the chemical liquid which it has to resist. Failure is invariably due to premature exposure to working conditions, *i.e.*, a vessel lined with acid-resisting tiles can be put into operation too quickly after the lining operation has been completed; likewise liquid may be passed through a pipe line much too soon after sealing the joints in the sockets of the individual pipe sections. For repair work of a temporary character rapid setting cements and putties are fortunately obtainable, but it does not follow that such compositions may be used in making joints which are to be permanent over a long period of time and especially under fluctuating temperature, concentration of acid, etc.

Value of Experience in Using the Products

Experience gained in the use of plant cement and putties gathered in the course of running a chemical works, will prove to be most valuable. The chemical engineer is therefore advised to keep notes of his observations regarding the preparation, application and actual performance of compositions which have been mixed according to the available recipes which are scattered through chemical engineering literature. Very little information has been published in correlated form for quick reference by the chemical engineer. A selection of certain cements and putties, some of which were used in chemical engineering practice in British explosive works from 1914 to 1918, has been published anonymously in England (*Ind. Chem.*, 1933, *9*, 381); others have been recorded in papers contributed to an American symposium (*Trans. Amer. Inst. Chem. Eng.*, 1927, *19*, 1). Useful compositions are also found in Perry's "Chemical Engineers' Handbook," 1934 (page 1,768) and Uhlmann's "Enzyklopaedie der technischen Chemie," 1930 (Vol. 6, page 553).

A solution of sodium silicate can be mixed with ground silica, asbestos fibre, pumice powder, clay, whiting, crushed brick or some similar material to provide a variety of acid-resisting cements. Such cements are generally slow setting, as when they merely set and harden by loss of water, but they can become quick setting if chemical reaction takes place between the silicate and one or more of the filler components. Subsequent modification is brought about by treating the hardened surface with an alkaline earth salt such as calcium chloride, or by treatment with sulphuric acid which converts the silicate into a tough insoluble gel. Mixed with asbestos fibre and asbestos powder to the consistency of a dough and subsequently washed with dilute sulphuric acid after setting, a solution of sodium silicate provides a good general purpose acid-resisting cement which can be used for setting acid-proof bricks, tiles, etc., and for making joints on plant units which are of chemical stoneware or fused silica. This type of cement can be used for sulphuric acid, nitric acid and also hydrochloric acid, but gives most satisfaction in the first two cases. If silica is used in place of the asbestos the cement acquires good refractory properties.

Use of Silicate Cements

Silicate cements generally demand the use of a sodium silicate in which the ratio of Na_2O to SiO_2 is between 1 : 3.2 and 1 : 3.5, a solution of concentration equal to a density of 70° Tw. being preferable. Such cements must be used sparingly, the thinnest possible joints being essential when fixing masonry, tiles or brickwork. Ample time must always be allowed for hardening to take place; there must be no hurry

in allowing the cement to come in contact with chemical liquids under working conditions. Where weak acid or salt solutions are to be handled, treatment with sulphuric acid after the cement has completely hardened becomes very essential, because a slight weakness is evident in the resistance of these cements towards water or weak aqueous solutions, especially at elevated temperatures, when unchanged sodium silicate will pass slowly into solution and a partial disintegration of the cement is possible.

Cements Resistant to Sulphuric and Nitric Acids

Pumice powder, completely passing through a 30 B.S. screen, but of which 80 to 85 per cent. remains on a 100 B.S. screen and less than 5 per cent. passes a 120 screen, can be mixed with sodium silicate solution to give a cement which is very satisfactory for general use in contact with sulphuric acid, especially at a sulphuric acid works. This cement can be used for bedding bricks or tiles in towers, and for the tile linings of reaction vessels generally, also for making joints on sulphuric acid concentrating plant. Where repairs have to be done any free acid must be neutralised and the repair surface dried as far as possible before applying the cement.

For nitric acid plant a slow setting mixture of asbestos fibre and powder with sodium silicate solution is recommended. The most satisfactory joints are obtained by using asbestos which has been leached with acid and subsequently washed and heated to destroy chalky impurities. The mechanical strength of this type of cement may be increased by the addition of 10 per cent. of pumice powder; the setting rate will be accelerated if 5 per cent. of ground barytes is added. A rapid setting cement made by mixing finely ground barytes, or precipitated barium sulphate, with sodium silicate solution will provide a hard and mechanically strong cement surface for protecting an underlying mass of some softer putty or lute which is used for sealing the sockets of stoneware pipes. This mixture when set offers exceptionally good resistance against the action of wet chlorine gas, and it will also be found of general utility for repairing fractured stoneware vessels and pipes.

Times of Setting

Ordinary silicate cements require from 70 to 100 lb. of sodium silicate solution for each 100 lb. of filler. Most mixtures take about seven days to attain a satisfactory degree of set by exposure to the air, but about thirty days will pass before the maximum strength is attained. This lapse of time is governed by the rate at which the water in the mixture evaporates, the temperature and humidity of the air being the main influencing factors. The need for quick setting mixtures has therefore caused a large number of proprietary brands to be introduced. These quick setting cements contain minor percentages of acid or of some material which gives an acid reaction in solution, the quick setting properties being acquired by the interaction of acid and silicate to yield colloidal silica or a gel in just the same way that ordinary silicate cement mixtures are hardened by washing the surface of the set cement with sulphuric acid as mentioned earlier. Organic acids such as oxalic or stearic acids, or salts such as fluosilicates, are generally incorporated, but there are also basic types of cement in which hydroxides, such as aluminium hydroxide, are used to produce an insoluble silicate in the course of setting. Some of the proprietary quick setting cements of the acid type have to be applied within ten to fifteen minutes of mixing; basic types are generally workable for double this length of time. Such cements can usually be put into service within twenty-four hours of being mixed and applied. Ordinary silicate cements which are chemically cured by treatment with acid may often be used after a lapse of forty-eight hours, but as so much depends upon circumstances the chemical engineer will profit greatly by keeping a note of his experiences. A word of warning might be added in connection with the use of ordinary silicate cement for building up a structure with acid-proof brick, namely, that the work should not progress at a greater speed than four to twelve courses per day, depending upon the weight of the bricks or masonry, owing to the risk of squeezing the cement from the joints.

Putties for Non-Rigid Joints

In cases where a non-rigid joint is necessary, as in sealing the sockets of stoneware pipes and in similar situations, there are several very useful putties which give good acid resistance and do not harden or crack under the influence of the weather. Litharge putty is made by mixing linseed oil (19 per cent.), litharge (73 per cent.), and flock asbestos (8 per cent.). It takes about seven days to set to moderate firmness, and is useful for plant where nitric acid or hydrochloric acid is handled; at room temperature it gives good resistance to nitric acid up to a concentration of 56 per cent. Of more general interest is the fact that this litharge putty provides the best type of non-rigid joint for sealing the annular space at the joint between each section of a stoneware tower. A mixture of asbestos powder (50 per cent.), asbestos fibre (10 per cent.), china clay (12 per cent.), and boiled linseed oil (28 per cent.) provides a putty which is permanently soft to an even greater degree. It is resistant to cold nitric acid at all concentrations and is therefore very suitable for joints on the condensing system of a nitric acid plant, such joints being liable to prove troublesome. For stoneware and other joints which are in contact with hydrochloric acid it will be found very satisfactory to use the stiff black putty made by mixing china clay (54 per cent.), dehydrated tar (38 per cent.), asbestos fibre (5 per cent.), and anthracene oil (3 per cent.). For bedding bricks and tiles in the construction of large tanks for hydrochloric acid, a thinner mixture composed of china clay (52 per cent.), dehydrated tar (28 per cent.) and anthracene oil (20 per cent.) is better.

Using a soft putty for sealing sockets upon equipment made of stoneware, fused silica and similar materials, the sockets are first plugged with asbestos cord and after filling in the putty the exposed surface should be finally sealed with a hard setting cement—applied in a thin layer—after allowing the putty to attain moderate firmness by exposure to the air for two or three days. It must be pointed out, however, that soft putties cannot be used in certain circumstances where the pipe-line or vessel willl be working under a noticeable internal pressure, even when the exposed surface of the putty is finished with a hard setting cement, unless additional precautions are adopted.

Acid Resisting Metal to Metal Joints

Red lead cement which is suitable for acid resisting cast iron and all acid resisting metal to metal joints is made by mixing red lead and glycerine to the consistency of a putty. This mixture must be applied thinly to the surfaces which are to be joined; it sets rapidly and is converted into a hard mass in the joint. For cases where a more slowly setting cement is needed it is possible to use a mixture of red iron oxide and boiled linseed oil. This mixture gives good resistance against sulphuric acid and hydrochloric acid up to 500° C. These two cements can also be used for making joints between iron and stoneware, or lead and stoneware. A mixture of litharge and glycerine provides another very useful type of cement, the characteristics of which can be changed by varying the proportions. The addition of water to the glycerine will hasten the speed of setting; with two parts of water to five parts of glycerine a mixture can be obtained which sets in ten minutes. The addition of whiting, silica or iron oxide gives a slower setting mixture, and if graphite is added, the joints to which the mixture is applied can be taken apart very easily. A mixture of litharge (5 parts), silica (3 parts), quartz flour (2 parts), and glycerine is very satisfactory for wet sulphur dioxide gas and hot sulphurous acid solutions.

A rubber putty made by mixing masticated rubber (1 part) with hot raw linseed oil (2 parts) and pipeclay (1 part) will be found useful where very flexible conditions are desirable. Portland cement mixed with rubber latex has been used as a bond between rubber and wood, or rubber and concrete, in the task of lining wood or concrete tanks with sheet rubber for the storage of hydrochloric acid and the handling generally of solutions containing hydrochloric acid. A preliminary coating of such a rubberised cement will make the rubber sheets adhere more firmly when the usual rubber cements are used as a means of providing adherence. Rubber cements are useful more especially for plant where hydrochloric acid is much in evidence; such cements, however, are unsuitable at elevated temperatures or in situations where oil vapours may be encountered. Chlorinated rubber, incorporated with certain organic solvents, provides mixtures which are notably resistant to the action of alkalies and to nitric acid up to a concentration of 42 per cent.

Incorporated with some inert filler, such as sand, sulphur makes a useful cement for use in the construction of acid towers and tanks, acid-proof floors and walls, metal pickling tanks, and in building chemical works drains. These sulphur cements are in a class by themselves. Below 95° C. they are resistant to sulphuric acid at all concentrations, nitric acid up to 45 per cent., and also to hydrochloric acid (except in the presence of large quantities of iron). Alkalies and oils, especially vegetable oils, are not tolerated. Strength depends upon the relative proportions of sulphur and sand, and also to a large extent upon the grading of the sand. A tensile strength of 400 lb. per sq. in. or more has been attained by a mixture containing 40 per cent. of sulphur, with the sand having 32 per cent. of voids. In making such a cement the mixture of sulphur and sand is heated to about 150° C. and well mixed to obtain an even distribution of the sand throughout the molten sulphur. The mixture is applied hot, but will be found rather stiff to use; working properties, however, can be improved by the addition of 2 to 5 per cent. of carbon black. The addition of carbon black also retards the settling of the sandy aggregate, and an increased strength is obtained for the cement when set. For instance, the tensile strength of a cement containing 70 per cent. of sulphur can be increased from 400 lb. per sq. in. to 660 lb. per sq. in. by replacing 5 per cent. of the sand with carbon black. Such a cement has excellent working properties and shows very little tendency for the sand to settle out. Certain organic sulphides which are soluble in molten sulphur can also be added for special advantages. Crushed pumice has been used in the place of sand, and particular characteristics with varying uses have been imparted by the addition of bitumens and fibrous materials. Iron filings and ammonium chloride can be added for use in jointing iron pipes, such cements having great strength due to the actual formation of iron sulphide in the sockets of the pipes. Used in the form of a thin film upon metal surfaces which are reasonably smooth, sulphur will sometimes give an adhesion strength equal to 900 lb. per sq. in.

The soaps of heavy metals when made into putties with linseed oil or some other drying oil provide a cement which is suitable for use in contact with hydrocarbon solvents. A mixture of dry white lead (3 lb.), white lead in oil (2 lb.), and 85 per cent. magnesia (1 lb.), with sufficient linseed oil to make up a stiff putty, will be found very satisfactory for the flanged and other joints upon plant where hot alcohol vapours may be causing trouble.

Picric Acid Storage

Home Secretary and Bradford Petition

THAT all possible precautions have been taken and there can be no reasonable ground for apprehending any repetition of the occurrences of 1916 and 1917, is the view expressed by the Home Secretary (Sir Samuel Hoare) in a letter to Mr. Herbert Holdsworth, M.P., for South Bradford, in respect of a petition he (Mr. Holdsworth) presented to the Home Office on behalf of some 2,000 residents in the Wyke and Low Moor districts of Bradford protesting against the action of the Watch Committee in granting an amending licence to A. H. Marks and Co., Ltd., chemical manufacturers, of Wyke, for the storage of picric acid at their works.

The petition, which was organised by Mr. Walter Smith, a Conservative member of Bradford City Council, representing North Bierley (East)—where many of the petitioners live—suggested that the storage of 30,000 lb. of picric acid by A. H. Marks and Co., Ltd., was " a serious menace to life and property in the district."

With regard to the explosions of 1916 and 1917, however, Sir Samuel Hoare points out that the manufacture and storage of picric acid was not, at that time, subject to the complete range of precautionary requirements which are now imposed. The amending licence granted by the Watch Committee allowed the storage of 15,000 lb. of picric acid in each of two magazines 70 yards apart, as against the allowance under the previous licence, of a total of 4,500 lb. equally divided among five magazines 20 yards apart. It is a condition of the licence, that there shall be a distance of at least 690 yards between each of the magazines and any outside dwelling-house, or half that distance if there is a mound between the magazine and the building. The amending licence does not increase the quantities allowed for any of the manufacturing processes, and he is advised that the finished explosive is comparatively insensitive and exceedingly stable.

Adsorption by Synthetic Resins

Hydroxyl Ion Take-up Most Rapid for Simple Polymers

THE adsorption of hydroxyl ions by synthetic resins has been investigated by Akeroyd and Broughton (*Jour. Phys. Chem.*, 1938, *42*, 3, 38). Resins, obtained by the condensation of formaldehyde with phenol, catechol, resorcinol, and phloroglucinol (in general precipitated on two parts of kieselguhr) were agitated in solutions of calcium hydroxide for considerable periods (up to three months). Analyses of the liquor were made at various intervals, and from them plots of the take-up of hydroxyl ions against time were obtained.

These plots were superficially similar to adsorption isotherms, in the earlier stages, but over an extended period they indicated quite definitely the formation of a compound, being very similar to the plots obtained in the case of calcium hydroxide and silica gel where calcium silicate is formed. This conclusion was supported by the figures for the final take-up of alkali by the simpler resins, which are very near the theoretical to be expected for complete saturation of all the free OH groups.

In complicated resins, *e.g.*, those formed from resorcinol and phloroglucinol, the amounts of alkali fixed even after three months were considerably below the theoretical. Thus the percentage saturation of the resorcinol resin after three months was less than that of the catechol polymer after seven days. This is attributed to steric hindrance, an effect which is enhanced by a high degree of polymerisation. The most rapid and complete adsorption was given by the resins having the lowest degree of polymerisation.

IN order to protect the Netherlands zinc white and lithopone industry, the Dutch Government issued a decree on February 20, 1935, placing an extra import duty on zinc white, lithopone, and other white pigments prepared with zinc. The regulation expired on March 1, 1938, but has been extended for a further year.

Coal Hydrogenation

Application of High Pressure on a Commercial Scale

IT is generally known that the hydrogenation of coal for the production of oil presents greater difficulties than the hydrogenation of low temperature tars, residual petroleum oils, and similar liquid and semi-liquid products. One of the difficulties in coal hydrogenation is the ash content of the coal which, together with the unliquefied part of the coal, forms a residual material of low fuel value.

About twelve years ago the well-known German fuel technologists, Pott and Broche, developed and patented a process for the pressure extraction of coal by suitable solvents and succeeded in obtaining up to 80 per cent. extraction of the coal substance in selected bituminous coals with the possibility of recovering the greater part of the solvent for re-use. The extract, when separated from the solvent, consists of a dark coloured fine powder, entirely free from ash and is a material particularly suited for hydrogenation to obtain oil. This success of the Pott-Broche extraction process has led to an interesting development which appears likely to prove an important advance in the technique of coal hydrogenation. This development is referred to in the March 31 issue of *Deutsche Bergwerks Zeit.*, from which the following particulars have been obtained.

The Pott-Broche process is to be operated by the Stinnes concern at the Welheim coal mine at Bottrop, and for this purpose the entire works there of the Ruhröl G.m.b.H. were taken over and adapted, and came into operation on March 30, 1938. In connection with this event, it may be mentioned that in 1926, research was commenced with the aim of extracting from coal a specially high-grade and chemically active raw material free of ash for the high-pressure hydrogenation plant of the I.G. Farbenindustrie A.G.

Preliminaries to Establishing the Plant

The results of this research were so far successful that a patent was applied for in 1927; in the following years the process was further developed and perfected in extensive laboratory work. At the end of 1934, after the patents had been definitely secured, a semi-commercial experimental plant was erected at the Matthias Stinnes 1/11 coal mine, which came into operation early in 1935. The results obtained were up to all expectations, and already in the autumn of 1935 it was decided to erect a plant on a commercial scale. In the autumn of 1936, an agreement was made between the Gewerkschaft Matthias Stinnes and the I.G. Farbenindustrie A.G., for the exchange of experience, and patents, and for the joint operation of coal extraction and coal hydrogenation. The first order for the necessary work at the Welheim mine was given in April, 1937, at the beginning of the second German Four-Year Plan, and later the scheme was brought within this plan. For the erection of the plant, the services of experts and specialists, as well as specially skilled labour, were supplied by the I.G. Farbenindustrie and the Leuna Ammoniakwerks, and although it was intended to complete the work very quickly, the difficulty in obtaining material caused considerable delay.

The hydrogenation plant to be used in the joint process operates at a pressure of 700 atmospheres; the products obtained are: a high-grade light motor fuel, diesel oil, and also a high quality fuel oil. The earlier hydrogenation plants, including that at Leuna, yield light motor fuel only. The operation of these connected processes will serve as a pattern for further operations of the same kind, particularly as the light motor fuel is said to be much superior to that obtained in the other hydrogenation works. The present plant, which is still regarded as a large scale experimental plant, is planned for extensive enlargement, and extension work is said to have already commenced. The operation of the plant will be under the control of Dr. Karl Winkler, the chief chemist, and the chief engineer is W. Richter.

The light oil obtained contains a high percentage of aromatics, and is said to possess anti-knock properties practically equal to those of benzol, while the fuel oil is quite free of asphalt, and its aromatic character makes it specially suitable for mixing with fuel oils from other sources containing asphalt or solid paraffin to prevent these from separating, or if such separation has occurred, to re-dissolve them. This property of the fuel oil obtained by high-pressure hydrogenation is said to be of great value for ships using fuel oil.

The proportions of the different products can be influenced through change of catalyst, of temperature, and other reaction conditions, and diverted either to the light oil or the heavy oil side. The production process falls into three main stages: first, is the extraction by the Pott-Broche process; second, the hydrogenation of the extract by the high-pressure process of the I.G. Farbenindustre A.G.; and third, distillation of the oil products into light motor fuel, diesel oil, and fuel oil. The employment of pressures up to 700 atmospheres on a commercial scale should yield valuable experience for further hydrogenation operations. In place of the coal extract, hard and soft pitch, pitch distillate, and the like can be successfully hydrogenated at the high pressures employed.

Demineralisation of Coke by Chlorine

80 per cent. Removal

IN an investigation of the demineralisation of coke by means of chlorine carried out by Dony-Henault (*Chim. et Ind.*, 1938, *39*, 225-234), coke was heated in an electric furnace in a stream of chlorine at 1,100° C., the average size of charge being 5-6 kg. The outgoing gas was passed through a condenser, where the sulphur, aluminium, and iron were recovered as chlorides, and then up a washing tower, in which the hydrogen chloride was removed. The treated coke was washed with water. In this way it was found possible to reduce the ash of the coke from 8-9 per cent. to 3 per cent. after 12 hours, and to 2 per cent. after 18 hours' treatment with chlorine. The removal of sulphur was not by any means so satisfactory, the initial content of 0.85 per cent. being reduced only to 0.6 per cent. after 12 hours' treatment, further chlorination producing no further improvement, so that it is concluded that only about 30 per cent of the total sulphur can be removed by this method. Desulphurisation by any method seems to be very difficult, as it could not be accomplished even by extracting the coke with sodium in a form of Soxhlet apparatus at 800° C.

Relatively large quantities of hydrochloric acid are formed in the process, due to presence of organic compounds in the coke. These could not, however, be removed by furnacing at a higher temperature, even at 1,550° C., prior to chlorination. The formation of this relatively useless by-product is considered to be the chief drawback of the demineralisation process, another being the fact that small quantities of chloro-compounds are formed and very strongly adsorbed by the residual coke, making their removal very difficult. Furnacing at 1,000° C. in a stream of hydrogen was necessary to accomplish this.

The laboratory experiments were repeated on a larger scale with similar results. The average extent of demineralisation obtained was 80 per cent., 1,000 kg. of coke yielding 80 kg. of aluminium chloride, 30 kg. of ferric chloride, and 36 kg. of finely divided silica in a very active condition, obtained by the hydrolysis of the silicon tetrachloride with steam. The treatment appears to increase the reactivity of the coke three to fourfold.

Chemistry: Retrospect and Prospect*

By

PROFESSOR F. G. DONNAN, C.B.E., D.Sc., F.R.S.

Professor F. G. Donnan.

THERE has probably never been a time when the prospects of chemical science were so splendid as they are to-day. Those who, like myself, began the study of chemistry some forty-seven years ago, are filled with envy of the younger men and the great future of scientific research that lies before them. When I went in 1893 to study organic chemistry under Johannes Wislicenus in Leipzig, what I might venture to call the classical period of that science was in a state of high development. Wislicenus was a famous exponent of stereochemical concepts. I remember proposing to him that I should investigate the action of iodine on the silver salt of hydrazoic acid or azoimide, with the object of obtaining the molecule N_6. Very politely but firmly the great man declined to allow me to try this idea. Probably he foresaw damage to his laboratory and the possibility of having to pay my funeral expenses.

Research Work in Ostwald's Laboratory

I moved in the late summer of 1894 to the laboratory of Wilhelm Ostwald. Being a very young man, I went with the lightheartedness of youth and became a physical chemist of the Arrhenius-Ostwald-van't Hoff school. Ostwald was regarded by many good and worthy men in this country as a strange sort of mathematical theorist, whereas in reality he was a very excellent and practical experimenter, who made comparatively little use of mathematics. At that time the early Arrhenius theory of ionisation in aqueous solutions was one of the chief themes of research in Ostwald's laboratory. For my Ph.D. thesis I had to measure colorimetrically the depth of colour of aqueous solutions of violuric acid containing various colourless organic acids. Fortunately for me, the results agreed fairly well with the simple ionic theory, though neither Ostwald nor I knew that a tautomeric equilibrium was also involved. I had, of course, to design and make my own colorimeter. Although the fact did not at all agree with the ionic theory of that period, I noticed that sodium chloride measurably affected the colour of a solution of violuric acid. This was a comparatively early example of a "neutral salt" effect. I could not explain it, but was much cheered by a kindly letter from Arrhenius in which he pointed out that he had observed similar neutral salt effects in some of his own investigations.

After completing my work in Ostwald's laboratory, I had the good fortune to be able to spend a year in van't Hoff's laboratory in Berlin. Those were the days when he was beginning his famous series of investigations on the conditions of formation and stability of the "Stassfurt" salts. It was a great revelation to me to see how by means of comparatively simple experiments and the simple (essentially thermodynamic) theory of heterogeneous equilibra, van't Hoff was able to trace out the various regions of stability, the "crystallisation paths," and the invariant points of the systems he was studying, i.e., the chlorides and sulphates of Na, K, Ca and Mg in presence of water.

In those far-off days physical chemistry was a comparatively simple branch of science. It was not very much influenced by the kinetic theory of matter as treated by the theoretical physicists. Ostwald once asserted in his lectures that there were only three men in Europe who understood—or thought they understood—this theory. Hence it was not of any use, and unlikely to be true. Indeed, the only part of theoretical physics that really aided chemistry at that time was thermodynamics. As everybody knows to-day, the thermodynamic theory of homogeneous and heterogeneous physico-chemical equilibrium had been completed by J. Willard Gibbs in 1878. His treatment was, however, too difficult for chemists to understand. Probably very few chemists read the books of Duhem and Planck, though the work of Le Chatelier in France and Helmholtz in Germany had a considerable influence. It was, I think, the writings of van't Hoff and Hernst's celebrated "Theoretische Chemie" (published in 1893) which first made the majority of chemists realise the value of thermodynamical principles and methods.

The period 1883-1913 might, perhaps, be called the "thermodynamic age" of physical chemistry. The development of the American school by Noyes and Lewis, the famous work on heterogeneous equilibria of Roozeboom, Schreinemakers, and van't Hoff, Haber's great treatise on the thermodynamics of technical gas reactions and Nernst's discovery of his third law were important landmarks of that period.

In spite of the enormous development since 1913 of both fact and theory concerning the intimate nature and structure of atoms and molecules, it is a rather striking fact that the period after the war has witnessed the appearance of a number of extremely valuable and important books dealing with "pure" thermodynamics and its application to chemical science. In support of this I need only mention the treatises of Lewis and Randall, Partington, Schottky, Ulich and Wagner, E. A. Guggenheim, and Brönsted. There is some justification for the statement that the study of thermodynamics still remains an important part of the training of the young chemist. Fortunately, or perhaps unfortunately, for him the scene is now rapidly changing—developing would be a better word. It is well known that the science of statistical mechanics founded by Maxwell, Boltzmann, and Gibbs provided a statistical basis for thermodynamic laws. For a long time this "rational" basis of thermodynamics remained a sort of caviare to the chemist. Nowadays, however, modern knowledge concerning the nature and possible states of atoms, ions, and molecules and modern quantum mechanics have transformed the older statistical mechanics and combined with it to produce a great statistical science of physico-chemical equilibrium which transcends and at the same time interprets and illuminates that earlier science of thermodynamics.

Influence of Physics on Chemistry

To those older men who, like myself, have lived through the period 1893-1938, it seems almost unbelievable how the rapid progress of physical discoveries and theories has in many respects revolutionised the science of chemistry. I remember at the Liverpool meeting of the British Association in 1896 deserting the Chemistry Section to listen to the discussion in the Physical Section on the then newly discovered Röntgen rays. Soon afterwards came the discovery of the negative electron by J. J. Thomson, the discovery of radioactivity and radium in France, and the famous work on the radioactive transformation of atoms carried out by Rutherford and his collaborators at Montreal and Manchester. These were great discoveries that the chemists of that period could understand, and we realised, perhaps at first a little slowly, that a vast extension of chemistry was in progress.

* Abstract from the Presidential Address to the Chemical Society at Manchester on March 31.

Important events soon followed, mostly due to Einstein and connected with the mysterious and apparently unchemical quantum; the theory of the specific heats of solids, the photo-electric effect, the theory of light quanta, and Einstein's photo-chemical law. It became clear that the blessed science of thermodynamics could not cope with these important new discoveries relating to "individual" events and apparent discontinuities, and that a new physical chemistry was rapidly being created. However, it could still be regarded as very "physical" chemistry by most of the members of this Society. Then came the bolts—or rather stars—from Heaven's brightest blue; the famous papers published in 1913 by Niels Bohr. The mysterious quantum had now invaded the atom, that sacred property of *all* chemists.

Development of the Electron Theory

Soon after Bohr's great discovery of the "quantised" Rutherford-Thomson atom, came the war and a slowing down of some four to five years' duration in the advance of chemical research. At November, 1918, I think there can have been very few who had any conception of what the following twenty years held in store for our science. The rapid advance of the electron theory of the "Rutherford-Bohr" atom under the influence of the earlier quantum theory brought a vast enlightenment concerning the nature and relationships of the elements. Then when the physicists were still drawing pictures of the orbits of their revolving electrons, two chemists, G. N. Lewis and Irving Langmuir (and one must not forget Kossel), utilised the electron theory, without worrying much about orbits, in a wonderful attack on the fundamental chemical problems of valency and molecular structure. This new electronic theory of valency and the chemical bond was expounded in G. N. Lewis' remarkable book, "Valence and the Structure of Atoms and Molecules," published in 1923. I think one may say that this particular and most important period of advance in chemical theory reached a certain culminating point when Sidgwick published in 1927 his famous book on "The Electronic Theory of Valency."

I must not, of course, forget to mention that about this time certain eminent organic chemists in this country, i.e., Lapworth, Robert Robinson, and Ingold were using electronic and similar concepts in an important development of the structure, polarity, and reactivity of organic molecules. Sterner events were not far off, for in the years 1924-26 came the new atomic theory and the new quantum mechanics, and already in 1927 Heitler and London had begun work on the chemist's molecule.

Suggested University Teacher in Theoretical Chemistry

The rapid invasion of chemistry during the last twenty years by the new methods and theories of physics has put an extra load on the students and teachers of chemistry at our universities. I know very well that a considerable proportion of the university teachers of chemistry are well versed in the new advances to which I have referred. But chemists, just like experimental physicists, are essentially experimental philosophers. They carry out research experiments, and are usually much occupied in directing the experimental investigations of groups of young postgraduate students. They cannot be expected to lead the life of a mathematician or theoretical physicist, nor is it in general possible for them to encroach too much on the time of good natured colleagues in another department. My suggestion is, therefore, that every important university department of chemistry should have associated with it, as a member of the staff, a professor, or at least a reader, in theoretical chemistry. Such a university teacher of theoretical chemistry would be in general what is called a theoretical physicist, although there is no reason why he might not equally well be a chemist who, owing to his special abilities and temperament, had gradually demonstrated his power of advancing knowledge on the theoretical side.

The older physical chemistry did not appeal to many chemists of that period, because it was not able to deal effectively with what really interested them, namely, the intimate structure of molecules and the real nature of valency. One must admit that this point of view had considerable justification. If you told a "really sound" chemist of those days that the kinetics of a particular reaction showed it to be uni- or bi-molecular, he naturally wondered why you worried about such incidental matters. What he wanted to know was where you got in the end. If you pointed to the successful study of a particular chemical equilibrium, he probably thought to himself, the poor fellow is talking of some badly chosen chemical reaction that he cannot bring to a finish. In extreme cases, the ionisation of electrolytes was regarded as an unpleasant sort of mass phenomenon that had more to do with electricity than chemistry.

Such objections cannot be lodged against the most modern developments of chemical theory. Although the theoretical physicist of to-day deals with electrons, atoms and molecules in a statistical manner, the results throw light on that intimate "individual" character of the units which has always been one of the main goals of the chemist. By the study of X-ray and electron diffraction, atomic and molecular spectra, Raman effects, dielectric constants and dipole moments, magnetic susceptibilities, unimolecular films on liquids, etc., etc., the sizes and shapes of molecules, their internal dimensions and dynamics, the nature and binding energy of valency bonds, the various types of excited states and energy levels of molecules, ions and atoms, and their essential reactivities and reaction possibilities have been greatly elucidated with the help of modern physical theory.

Scope of Organic Chemistry

Organic chemistry continues its majestic advance with unfailing vigour. Not only in its own more special field, but also in the investigation of substances of biochemical occurrence or importance, it can show a progress unequalled in any earlier period—natural colouring matters and related substances, carbohydrates, complex hydrocarbons, sterols, polynuclear compounds, high molecular polymers and condensation products, vitamins, hormones, phytohormones, and even the prosthetic groups of certain enzymes. In the field of applied and industrial chemistry equally great advances have been made—new and important dyestuffs, emulsifying, wetting and "levelling" agents, synthetic rubbers, antioxidants and vulcanisation accelerators, modern synthetic resins and "plastics," pesticides, fungicides, new and important chemotherapeutic agents. Here, doubtless, are great regions of thought and fruitful action where the synthetic organic chemist still roams untroubled as yet by electron drifts and stresses, eigen functions, or waves of probability.

There will always be, I think, a certain marked difference between chemists who are chiefly interested in the laws of phenomena and the generalisation of these laws, and those others whose main interest lies in the nature and behaviour of particular chemical substances or classes of substances. Perhaps I might be permitted to call the first category the physical chemists "par excellence." Their investigations have resulted in enormous advances during the last twenty years.

The Expanding Field of Nuclear Chemistry

A great and splendid prospect, a land of "rare and refreshing fruit," lies before the chemists of the present day. Every experimental tool and every theory of the physicist are at their disposal, ready to be applied to an ever-increasing wealth of material. Nuclear physics will soon become nuclear chemistry. In the famous days when Rutherford and his collaborators at Manchester were elucidating the transformation of the naturally existing radioactive atoms, he used to call on chemists to take a hand. If that great man were alive to-day, he would be the first to call on us to enter the great and rapidly developing fields of nuclear chemistry. This is nothing less than a reconstruction and a re-integration of the whole "material" world," in which matter and energy play equivalent parts.

Industrial and Engineering Chemistry

Abstracts of Papers read at the April Meeting of the American Chemical Society

SEVERAL papers of general interest from an industrial and engineering aspect, and in connection with petroleum chemistry, were presented at a meeting of the American Chemical Society, held at Dellas, Texas, this week.

Casting Sulphur Pipe. Isaac Bencowitz, Texas Gulf Sulphur Co.

Preliminary studies indicate that sulphur may be used as the cementing agent in the centrifugal casting of pipe. The best results were obtained when the sulphur was used in combination with sand and a rather coarse aggregate such as coke. The strength of the pipe together with its resistance to thermal changes was further improved by the addition of shredded asbestos. Such pipe withstands a hydraulic pressure of 75 lb. per sq. in. Similar mixtures of an aggregate and sulphur can also be used to line steel pipe. Steel pipe so lined as well as pipe made entirely of sulphur combined with an aggregate have proved to be resistant to attack by salt water and corrosive " bleed water " after four years' exposure. It is suggested that possibly such pipe can be used for the conveyance of corrosive liquids. Sulphur being comparatively inert should be proof against attack by certain acids and certain salt solutions and should also act as a thermal insulating material.

The Properties and Uses of Pentachlorophenol. T. S. Carswell and H. K. Nason, Monsanto Chemical Co.

Pentachlorophenol, which was first described in 1931, is now being produced commercially for the first time in the United States. Physical, chemical, and toxicological properties render it particularly attractive as an agent for the control of micro-organisms. Its uses include the preservation of wood and wood products, pulp and paper, textiles, starches and dextrins, gums, glues, casein, albumin, leather, and latex. It is particularly valuable for slime and algæ control.

Sulphamic Acid, a New Industrial Chemical. Martin E. Copery, E. I. du Pont de Nemours and Co.

A new process has been developed by which sulphamic acid, HSO_3NH_2, is readily prepared from urea and fuming sulphuric acid. The process appears to be suitable for large-scale production, so that sulphamic acid is now potentially available as a new industrial raw material. It is a colourless, odourless, non-hygroscopic, crystalline product which may be handled and packaged commercially in a solid form. In aqueous solution it is highly ionised, forming strongly acidic solutions. Under ordinary conditions, sulphamic acid is practically stable in water, while at increased temperatures it is slowly hydrolysed to ammonium acid sulphate. Similarly, alcoholysis yields ammonium alkyl sulphates. The salts of sulphamic acid are stable in neutral or alkaline solution, and such solutions may be evaporated with heating without hydrolysis of the amine group. All of the known salts of sulphamic acid, with the single exception of a basic mercury salt, are soluble in water. Salts such as lead and barium sulphamate show exceptionally high water solubility. Ammonium sulphamate shows promise as a flame-proofing agent for textiles, paper and other combustible materials.

The Fate of Soluble Potash Applied to Soils. Emil Truog and Randall J. Jones, University of Wisconsin

When soluble potash is added to soils it soon dissolves in the soil solution and then moves about by diffusion and the movement of the soil water. It has, however, been found that in many soils a portion of the exchangeable potassium in time passes over to a non-exchangeable form. Some evidence has been obtained indicating that this non-exchangeable form is muscovite or a closely allied mineral. It has also been found that alternate wetting and drying hasten the fixation in non-exchangeable form. From a practical standpoint, the question arises: How can this fixation in non-exchangeable form be lessened or prevented? Application of potash fertilisers at a depth of several inches in place of at the surface so as to lessen the influence of alternate wetting and drying suggests itself as a measure worthy of attention. Localised application of fertiliser and the use of granular forms of fertiliser should also help considerably. Introduction of organic matter which supplies organic base-exchange material should be helpful since entrance of potassium in the organic exchange renders the potassium safe from fixation in non-exchangable form for the time being.

Equilibria in the System K_2SO_4-$MgSO_4$-$CaSO_4$-H_2O at 100° C. J. E. Conley, Alton Gabriel, and Everett P. Partridge

This four component system was studied at 100° C. and both the stable and metastable equilibria were investigated. As a result of a considerable number of tests the tentative stability fields for syngenite ($K_2SO_4.CaSO_4.H_2O$), pentasalt ($K_2SO_4.5CaSO_4.H_2O$), polyhalite ($K_2SO_4.MgSO_4.2CaSO_4.2H_2O$), and anhydrite ($CaSO_4$), have been defined within the limits of 17.0 grams K_2SO_4 and 14.0 grams $MgSO_4$ per 100 grams of water at 100° C. The actual attainment of the final equilibria was found to be extremely slow, and in some instances incomplete after 60 and 69 days. Metastable equilibria were encountered in nearly every portion of the area explored and in certain cases were distinguished from stable equilibria only by the utmost precautions. Invariably, the short-time tests of a few hours or even several days resulted in metastable conditions. Pentasalt was found to persist in a large portion of the area studied and particularly when initially placed in the anhydrite field. Natural anhydrite reacted at a very slow rate also, but the limited stability and the fact that all of the calcium sulphate must pass through the solution phase to be available for subsequent reaction explains this phenomenon. The form in which the calcium sulphate is added to the mixtures used in the study of this system is extremely important. The stable form is anhydrite. If gypsum is used, metastable equilibria are obtained and the gypsum slowly alters to hemihydrate and finally anhydrite.

Reaction of Hydrocarbons in Electrical Discharges. Charles L. Thomas, G. Egloff, and J. C. Morrell, Universal Oil Products Co.

From available data on the reactions of hydrocarbons in the various types of the silent discharge it has been found that two types of reactions will explain the products when the reactions are studied under sufficiently mild conditions to obtain the primary or secondary reaction products. These reaction types are:

1. Dehydrogenation $\rightleftharpoons$ hydrogenation.
2. Polymerisation $\rightleftharpoons$ depolymerisation.

Typical examples are (a) ethylene gives 1-butene (polymerisation) or acetylene plus hydrogen (dehydrogenation) and ethane (hydrogenation), (b) acetylene gives dipropargyl and divinyl-acetylene (trimers), (c) benzene gives dihydrodiphenyl (a dimer) and then diphenyl and hydrogen, (d) the paraffin hydrocarbons react by dehydrogenation on dealkanation followed by polymerisation of the olefin so formed. These same reactions help to explain the reactions observed during the electrical treatment of oils to improve their viscosity; hydrogen is liberated and the residue polymerises.

Solvent Extraction of Diesel Fuels. C. G. Dryer, J. Chenicek, G. Egloff, and J. C. Morrell, Universal Oil Products Co.

Solvent extraction of cracked diesel fuels with sulphur dioxide and furfural produced raffinates with improved ignition quality without materially affecting other physical properties. The improvement depended upon the solvent, the percentage removed, and the method of extraction. The raffinates showed unchanged susceptibility to a pour point depressant. The extracted portions had high-octane blending values and low pour points. Extraction of straight-run fuels caused less improvement in ignition quality than solvent treatment of cracked fuels. Acid treatment resulted in a negligible increase in ignition quality. Hydrogenation of low sulphur content fuels produced high ignition quality fuels.

"Dehydropolymerisation" of Ethylene, V. I. Komarewsky and N. Balai, Armour Institute of Technology

It was found that by subjecting ethylene to a catalytic polymerisation in the presence of polymerising and dehydrogenating catalysts a directed polymerisation takes place with an increased formation of aromatic hydrocarbons. By subjecting ethylene to a thermal polymerisation (no polymerising catalyst) in the presence of dehydrogenating catalyst a formation of aromatic hydrocarbons takes place. Both reaction can be defined as "dehydropolymerisation."

Destructive Hydrogenation of Alkylated Monocyclic Aromatic Hydrocarbons. V. N. Ipatieff and Herman Pines

Alkylated monocyclic aromatic hydrocarbons at a temperature of 350° to 400° C. and initial hydrogen pressure of 100 kg. per sq. cm. underwent destructive hydrogenation, yielding paraffins and aromatic hydrocarbons. In the case of methyl- and ethylbenzenes the paraffins resulting from such reaction were methane and ethane, respectively. However, in the case of propyl- and butylbenzene, the destructive hydrogenation is more complicated—the gaseous hydrocarbons, besides propane and butane, contain also methane and ethane. The liquid products consist of benzene, toluene, ethylbenzene, etc. The phenyl groups seem to weaken the β - γ carbon-carbon bond to the greatest extent; as a result n-propyl and n-butyl-benzene yielded ethylbenzene. In the case where the alkyl group is branched as in isopropyl- and tertiary-butylbenzene the most reactive carbon-carbon bond is the phenyl-alkyl bond, and the gaseous products contained large proportions of propane and isobutane, respectively.

Acid Resisting Cements and Mortars

Some Well-Known Commercial Brands

KEEMENT cold setting acid-resisting cement, supplied by the Kestner Evaporator and Engineering Co., Ltd., is a mixture of special synthetic resins and suitable fillers intimately mixed to form a high grade cement. It is mainly used for setting and pointing acid-resistant bricks, tiles, linings, etc., and for any purpose where a non-porous corrosion-proof cement is required. It is not a plaster and should not be used as a coating material. With excellent resistance to acids, salts, solvents and other corrosive agents, Keement is simple to use and requires no heat treatment or stoving. The cement is simply mixed with an accelerator composed of sulphuric acid and methylated spirit in specified proportions and applied to the job by trowelling. Self-hardening of the cement takes place at ordinary temperatures within a few hours. The set cement is resistant to extreme temperature changes and will not crack by freezing or by boiling acids. It does not soften by age or temperature, but regular inspection is advocated to ensure that tiles or bricks have not been cracked or damaged by rough treatment, and that any faulty places can be re-made at once. Keement is not resistant to strong oxidising agents such as chromic acid, nitric acid, caustic soda, caustic potash, sulphuric acid above 50 per cent., or acetone, hydrofluoric acid and the fluorides.

When laying tiles or linings against surfaces such as concrete, plaster and iron in particular, it is advisable to protect the surface before applying Keement. For this purpose an air-drying synthetic lacquer is supplied to be applied by an ordinary paint brush. Keement lacquer, which dries within a few hours, is also used for protecting metal surfaces in contact with acid fumes, such as the iron bands on timber tanks, and it makes an excellent acid resisting paint.

Cement Prodor, obtainable from Prodorite, Ltd., can be used with good results in any situation where acid liquors or fumes are present. Its special self-setting property allows it to be used in enclosed spaces where air drying cannot be obtained, and it will set rock-hard in such places without help by air drying. It is supplied in powder form, suitably blended to give convenient setting results, when mixed, as directed, with a special solution which is supplied. It is mixed up into mortar in the ordinary way and should be applied with a trowel. This Cement Prodor is particularly suitable for building acid tanks, acid process tanks, neutralising sumps, walls, towers, floors, chimney linings, etc., with any type of acid resisting brick or tile. It is also very useful as a cement for bedding in any form of lining tile or block for acid liquor constructions. Stoneware pipes have been satisfactorily jointed. The set cement is very hard and has good mechanical properties. The tensile strength is equal to that of good 3 to 1 sand and Portland cement mixtures. It is resistant to most ordinary acids and will not disintegrate. In addition, Cement Prodor, unlike some acid-proof cements, will stand up to a good deal of weathering and will not soften. The heat resistance is very good, and refractory tests show that the set cement is unaffected at temperatures up to 1,100 to 1,200° C.

KERASOL acid-resisting mortar, a product of H. Windsor and Co., Ltd., has been introduced with the idea of providing a suitable protective layer or a jointing material for humid or wet surfaces. It can be used everywhere where weak acids, alkalies and salts solutions are handled, and for this purpose is particularly useful in dye works, bleaching works, etc. It can be used as a jointing material for acid-resisting tiles, being mixed with Kerasol liquid and not with water. Kerasol is a hydraulic setting mortar; it is impervious to water and resists slightly stronger concentration of acids than ordinary acid-resisting mortar. It will stand up against acetic acid up to 8 per cent., lactic and butyric acids up to 12 per cent., nitric acid up to 8 per cent., sulphuric acid up to 6 per cent., and hydrochloric acid up to 3 per cent. It is supplied ready for use in the form of a powder and a mixing liquid.

Acid-resisting Spatula Compound, another product of H. Windsor and Co., Ltd., is specially recommended for making liquid-proof, acid and alkali-resisting underlayers on horizontal, vertical and inclined surfaces, and for bedding and jointing tiles. It should be used in all cases for setting tiles where the liquid changes from acid to basic or neutral. If the constant temperature of the acids or alkalies is below 150° F., it can be used without any subsequent layers of tiles (as in tannery pits), for layers on concrete and brick vessels, in sewage pipes, dye vats, neutralising tanks, etc. If applied underneath tiles or bricks, higher temperatures do not affect it, and frost has no effect on it. A layer of only ¼ in. thickness will prevent any penetration of liquids. It takes up any expansion of the surface to which it is applied without cracking or flaking, and will adhere firmly to any building material.

I.C.I.'s Sound Position

Lord McGowan's Speech at the Annual Meeting—Reorganisation and Prospects

IN his speech at the 11th annual general meeting of Imperial Chemical Industries, Ltd., held on Thursday, Lord McGowan, the chairman, referred to the changes in the organisation of the company which had recently been announced, and which were regarded by the board as a natural development of its policy of decentralisation. Responsibility for everyday decisions on current business was in future to be taken by seven executive directors dealing with the commercial, financial, overseas, personnel, research and technical sections and the Groups' Central Committee. These directors had already shared in all important decisions for a number of years and the scheme would allow the chairman and president more time to devote themselves to the company's major policies.

Lord McGowan described I.C.I. as "never in a sounder position." Even if British industrial activity were to show some decline during 1938 it did not follow that I.C.I. would be affected in the same measure as general business. International trade in 1937 had been largely under the influence of two opposing factors. Rising commodity prices, the Government's rearmament programme and conditions in America seemed during the first quarter of the year to justify the expectation of a period of expanding business, but confidence was weakened by conditions in Spain and in the Far East and by a sudden fall in business in the United States. Nevertheless I.C.I.'s overseas trade had made progress in many directions.

In India new manufacturing units were being established in the Punjab and Bengal for the manufacture of alkali and chlorine products. A participation of £230,000 in the capital of the company formed for this purpose was offered to Indian investors and was fully taken up within two days of issue.

It was hoped that plans for industrial development in China between I.C.I and Chinese interests, which had had to be postponed indefinitely, would eventually materialise. "I am not prepared to forecast the outcome of the present situation," said Lord McGowan, "but there must come a time when the commercial development of China will be resumed, and I cannot believe that any one nation will be able to reserve for itself all the advantages of the future." With regard to Japan, purchases from abroad were limited to bare necessities, but the diversion of factories in that country from industrial to war purposes had reduced Japanese competition in other parts of the world.

Exchange regulations still tended to form a brake on the progress of trade, but the reception given to the Van Zeeland report showed that there was a large body of influential opinion anxious to find means of freeing world trade from this particular form of obstruction. Lord McGowan said he could only hope that in due course the report would receive the careful consideration and practical support it deserved. He also gave a warning on the danger to export business of rising costs :—"While fully alive to the national importance of export business, because of its influence upon the country's balance of payments, especially when rearmament compels the importation of additional raw materials, we cannot close our eyes to the fact that much of this business is conducted on a very narrow margin of profit. Rising costs at home, due partly to the increased price of materials and partly to higher standards of wages—not unnaturally sought by Labour organisations—may so encroach upon the present narrow margin of profit as to wipe it out all together. If costs are pressed too high, the volume of home employment will surely suffer."

While nearly all I.C.I. plants were running to capacity it became necessary every year to provide additional facilities for research. The rapidity of scientific advance in this and other countries demanded on the part of every industrial corporation active attention to development in order to safeguard its future prosperity. New laboratories had been opened for the Dyestuffs Group at Manchester and for the Metals Group at Birmingham. Two more had been authorised, one at Manchester for leathercloth and one for paints and lacquers at Slough. I.C.I. would then have a total of 18 research stations, representing a capital investment of not less than £850,000 and employing over one thousand people.

Finally, Lord McGowan referred to the discovery of the new water repellant compound, "Velan," a chemical achievement which had created very great interest on the Continent and in the United States; to the research on new products for the control of pests; to the collaboration with the London School of Hygiene and Tropical Medicine on a basic study of immunisation; to the development of the chlorinated rubber known as "Alloprene" in the paint and lacquer industries; and to a new method of producing from coal a highly reactive charcoal.

Carbide Manufacture

A Scheme for Flintshire

THE proposal to set up a calcium carbide factory to employ 1,500 men on the Flintshire coast near Holywell was carried a step farther on April 13, when it was considered at a private meeting of the Flintshire Industrial Development Committee here.

It was pointed out to the committee that the Caledonian Water Power Bill, which provided for the establishment of a similar factory in the Scottish Highlands, had been rejected in the House of Commons, and the committee was asked to consider whether, in view of Parliament's action, the time was opportune for pushing forward the Flintshire scheme. The committee decided that representations should be made to Sir Thomas Inskip, the Minister of Defence, urging the importance of the Flintshire scheme in view of the necessity for producing calcium carbide, and the potential value of the scheme in solving the county's unemployment problem.

The scheme briefly provides for the building by a Manchester syndicate of a factory at Llanerchymor, near Holywell, on a site which has a deep water pier and is on the main road and railway line. It is claimed that the factory could be in operation in twelve months, and that with limestone of high quality on the site the carbide could be produced there more economically than anywhere else.

Durability of Asphalts

Increase on Addition of Fillers

The results of weathering tests on filled asphalts are reported by Strieter (*Bureau Standards Jour. Res.*, 1938, *20*, 159-171). The tests were carried out, both out of doors, in various localities in the U.S.A., and also in an accelerated testing machine It was established that the addition of fillers increased the durability of asphalts in all cases tested, except calcium hydroxide. The best results were obtained with talc, mica, and slate; while silica, dolomite and limestone were not so efficient. Hydrated lime did not improve the durability at all, and when added in considerable amounts, decreased it.

The enhancement of durability was proportional to the percentage of filler added, the highest addition being 35 per cent. Also, it appeared that very fine material (passing through 200 mesh), was not so efficient as somewhat coarse material (between 100 and 200 mesh).

New Technical Books

A BRIEF INTRODUCTION TO THE USE OF BEILSTEIN'S HANDBUCH DER ORGANISCHE CHEMIE. By Ernest Hamlin Huntress. 2nd Edition. Pp. 44. New York: John Wiley and Sons, Inc. London: Chapman and Hall, Ltd. 5s.

Since the original publication of this pamphlet, twenty-seven more volumes of "Beilstein" have appeared completing (1938) both the main and first supplementary series for compounds of established structure in the acyclic, isocyclic and heterocyclic divisions. There remains still unpublished a large section of material dealing with compounds of natural origin whose structure was unknown in 1920, but since these will be mainly of interest to specialists in the several fields the fourth edition of "Beilstein" may be regarded as complete to 1920 for all ordinary purposes. This point in the history of the work is particularly interesting and timely, since 1938 marks the centennial anniversary of the birth of Friedrich Konrad Beilstein (1838-1906). Apropos of the general applicability of the Beilstein plan as a method of classification the author has personal knowledge that the research laboratory of at least one large industrial organisation engaged in the manufacture of organic chemicals has developed a filing code based entirely on the Beilstein system. This code is used for filing all samples of organic compounds, and also for classifying and filing patents, research reports, correspondence and miscellaneous information relating to organic substances. In the second edition of this "Introduction to Beilstein" the original intention to keep its content as brief as consistent with adequate clarity has constantly been kept in mind. The author has brought up to date the charts comprising the nucleus of the exposition and has inserted some new text.

CALCULATIONS IN QUANTITATIVE CHEMICAL ANALYSIS. By John A. Wilkinson. 2nd Edition. Pp. 154. London: McGraw-Hill Publishing Co., Ltd. 10s. 6d.

It is ten years since the publication of the first edition of this book. In accordance with the present usage in analytical chemistry, the term millimetre has been substituted for cubic centimetre. Some of the problems in the first edition have been dropped or reworded, because it had been found that the data—as presented—were either ambiguous or misleading. As emphasised in the first edition, the greatest difficulty the student has is in visualising the significance of the data given in the problem. Numerous small changes have therefore been made to overcome this difficulty. The first chapter, on "Calculations from Equations," has been enlarged to clarify the treatment of the weight and volume relationships in reactions involving gases. Special emphasis here has been placed on the idea of setting up the complete solution of the problem before starting the mechanical work of find the answer. In Chapter VI, "Calculation to a Dry Basis," a graphic method has been introduced in an endeavour to show what is happening during the wetting or drying of a sample. The author has tried to show that quantitative calculations are essentially of few types, easy of solution when recognised and classified by the student.

SEMI-MICRO QUALITATIVE ANALYSIS. By Paul Arthur and Otto M. Smith. Pp. 198. London: McGraw-Hill Publishing Co., Ltd. 12s.

Semi-micro technique is one of the most recent advances in analytical chemistry. Although its spread was greatly retarded by a scarcity of textbooks using semi-micro methods, its marked advantages—lower expense for the student, increased accuracy, greater skill and respect for cleanliness, and the ability to cover more and varied work in the allotted time—have led many progressive educators to adopt it. The purpose of this book is to present a system of semi-micro qualitative analysis in such manner as to make it clear, easily understood, and, as far as possible, self-administering. The scheme used is little different from the customary macro procedure, only the technique and a few of the reagents being changed. Little actual dependence is placed on organic reagents, as the authors feel that inorganic reactions, which are more easily understood by the student, should be emphasised. Some use of the better organic reagents is given in order that the student may become acquainted with the advantages and disadvantages of the most dependable ones. Thus, while the characteristic reactions of the ions and the laws of chemistry receive chief emphasis, practical aspects are not overlooked. Extensive use has been made of supplementary notes to maintain a close connection between the laboratory and theory.

INTERMEDIATE READINGS IN CHEMICAL AND TECHNICAL GERMAN. Edited by John Theodore Fotos and R. Norris Shreve. Pp. 219. New York: John Wiley and Sons, Inc. London: Chapman and Hall, Ltd. 9s. 6d.

The purpose of this book is to facilitate the study of German for chemists, chemical engineers, metallurgists, and pharmacists, and to serve as an introduction to the reading of chemical German from standard German reference books. It is one of a series of four that have been prepared through the co-operation of the School of Chemical Engineering and the Department of Modern Languages at Purdue University. A number of years ago it was noted that many students did not take the active interest in the study of chemical German that this subject deserves, and it was thought that the interest of the student would be enhanced if extracts from practical and widely-used reference works were read in place of the traditional literary or condensed scientific articles. The selections have been made to illustrate not only variety of subject matter, but also variation in style and progressive difficulty in reading. Much work has been done in editing, to save the student's time and to facilitate the study and accurate comprehension of chemical German. In the introduction is a review, entitled "Reading Difficulties of Scientific and Chemical German," which is followed by a list of the most frequently occurring chemical German words; by actual count these words have been found to have a frequency of three or more times in the selections to be read. The new words appearing in the German text for the first time are listed in the order of their occurrence immediately after each selection. At the back of the book is an alphabetical list of all the German words, with translations, occurring in the various reading selections; if, therefore, the student forgets the meaning or meanings of words he can always consult the vocabulary at the back of the book. Each word in the complete vocabulary is followed by a number indicating its frequency of occurrence in these selections.

QUALITATIVE INORGANIC ANALYSIS. By A. J. Berry. Pp. 147. London: Cambridge University Press. 6s.

This book has been written primarily in the interests of the author's own pupils, and in two directions radical departures from established custom have been made. In the first place, the arbitrary distinction between common elements and a few of the so-called rare elements has been broken down. In making a selection of such elements, their scientific interest and technical importance have been taken into consideration. In the second place, as much progress has been made in the way of applying new reagents—particularly organic compounds—to inorganic analysis, it has been the object of the author to awaken the interest of the student in this aspect of the work by introducing him to a few of the more readily accessible new reagents. As its title-page indicates, this book deals with inorganic qualitative analysis; the few organic acids which are included have been limited to such as are of direct importance to this branch of the subject. Some indications are given of the limitations of the usual methods of effecting separations. The group reactions of the metals and the preliminary reactions of the acid radicals have, however, been summarised in tabular form.

"Men Without Work"

The Employer's Responsibility

AS a wealthy charity, the Pilgrim Trust has to consider many claims in connection with unemployment; their problem is to know which organisations are really worth helping. The Trustees, therefore, financed an inquiry, which was carried out by impartial investigators in some typical towns, and the conclusions are now published in a report entitled "Men Without Work" (Cambridge University Press 7s. 6d.).

That unemployment is not simply a problem of industry and the man out of work, but of his family and the community, is the underlying theme of this book, which combines careful statistics with a human picture of unemployment in its effects on the individual. The inquiry was not confined to the Special Areas, but covered intermediate and prosperous places as well, the six towns selected for study being Rhondda, Crook, Blackburn, Liverpool, Deptford and Leicester. The inquiry was confined to those who had been out of work for more than a year, and altogether nearly 1,000 homes were visited.

Although a few doors were slammed in the faces of the investigators, it was found that most of the men interviewed were glad to talk, as they had never before had such an opportunity of discussing their difficulties. Even a summary of the resulting conclusions would require many pages of THE CHEMICAL AGE, but a few extracts will illustrate the wide scope of the report.

One point that clearly emerges is the responsibility of the employer towards juvenile labour, which is too often taken on at the school-leaving age and discharged as "too old" at 21, when a man's wages would otherwise have to be paid. There are, of course, certain occupations for which only boys are suitable, but it is disquieting to read that a third of the unemployed labourers under 40 in Leicester began their working lives in boot and shoe factories, only to be discharged when 18 or 21. The report quotes a social worker who "shuddered to think what would happen in a few years' time to thousands of young men from Wales and the North, who are now in what seems to them good employment, but who, when they become entitled to a man's wage, may be turned off." No doubt economic arguments can be adduced to justify the present position of juvenile labour, but all is not well with British industry while such problems remain unsolved.

The relation of machinery to employment is another question dealt with in the report. In many industries mechanisation has actually increased employment, but in some cases technical changes are so rapid that a machine becomes out of date in a few years. "If the man who is working it is not as young as he was, he does not get taken on to work its successor. Moreover, new machines in most instances make the work much simpler than it used to be, so that they can be worked by women, or boys or girls, as easily as and more cheaply than they can be worked by men." The increasing employment of women has, of course, contributed to the general prosperity, but has not been an unmixed blessing for the male worker.

Another factor in the report is "rationalisation," which has created unemployment among older men whose services are too often dispensed with when amalgamations occur. It would, however, be inaccurate to imply that the responsibility in such matters rests solely with the employer, for in some cases the Trade Unions are, in practice, a vested interest which makes it hard for a worker who has lost his footing to get back into employment.

Dealing with the position in the Special Areas, where new industries are an imperative need, the authors give an encouraging report on Crook, in south-west Durham, a town to which attention has previously been drawn in THE CHEMICAL AGE.

It will, of course, take many new factories to adjust the

(*Continued at foot of next column.*)

Chemical Matters in Parliament

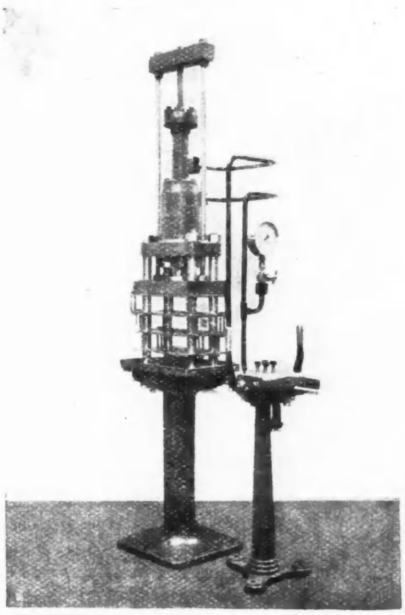
Calcium Carbide Production

IN the House of Commons, on April 13, Mr. D. Adams asked the Minister for the Co-ordination of Defence whether, in view of the rejection by the House of the Caledonian Power Bill, the Government would take into consideration the desirability of establishing plant for the production of calcium carbide in one of the Special Areas, preferably that in the coalfield of County Durham.

In reply, Sir Thomas Inskip said he did not think that such provision would be appropriate in this case, the direct Government requirements being very small. If private enterprise was concerned he knew of no reason why persons interested should not undertake such production, should they choose to do so.

In another question to Sir Thomas Inskip, Mr. Bevan had asked if any private concern intimated its intention to produce British requirements of carbide in this country?

In reply, Sir Thomas Inskip said that the only private concern which has indicated its intention to produce calcium carbide is the British Oxygen Co. which, in accordance with the undertaking it gave, is proceeding with the erection of a factory at Port Talbot. That factory will not be sufficient, having regard to the size which is intended, to provide the whole of the British requirements.



An order for equipment, including two 100-ton and one 21-ton hydraulic presses, for dyestuff manufacture has recently been completed by T. H. and J. Daniels, Ltd. All the presses incorporate Monel components to prevent corrosion where the dystuffs come in contact with the equipment. The 21-ton press, shown above, is of the downstroke type with a 3 in. diameter mild steel ram, which is fescolized with nickel and ground. Anti-corrosive parts include five ½ inch thick Monel plates, 10 in. square, supported by the moving table and suspended from each other by means of solid Monel links. The press columns are fitted with solid drawn Monel sleeves and a Monel tray receives the corrosive liquid.

balance of industry in the Special Areas, but most big developments start in a small way. The variety of factories already started on the Trading Estates shows that the areas are a "business proposition" if tackled with vigour and optimism, and the splendid calibre of the men available for work is confirmed beyond any doubt by this Pilgrim Trust inquiry.

British Overseas Chemical Trade in March

According to the Board of Trade returns for the month ended March 31, 1938, imports of chemicals, drugs, dyes and colours were valued at £1,169,295, as compared with £1,119,313 for March, 1937, an increase of £49,982. Exports were valued at £1,969,366, as compared with £2,124,144, a decrease of £154,778. Re-exports were valued £30,850.

Imports

	Quantities. March 31, 1937.	Quantities. March 31, 1938.	Value. March 31, 1937.	Value. March 31, 1938.
Acids—				
Acetic .. .. cwt.	13,555	7,308	14,995	8,551
Boric (boracic) .. ,,	8,030	3,480	8,140	3,864
Citric .. .. ,,	1,982	1,021	7,881	4,183
Tartaric .. ,,	4,455	1,715	18,385	7,848
All other sorts .. value	—	—	6,548	8,569
Borax .. .. cwt.	28,609	18,789	14,598	11,773
Calcium carbide .. ,,	106,761	94,932	57,679	50,175
Fertilisers, manufactured—				
Superphosphate of lime tons	5,181	2,866	11,271	7,073
All other descriptions ,,	1,481	1,503	8,094	9,177
Potassium compounds—				
Caustic and lyes cwt.	12,145	11,449	13,217	12,278
Chloride (muriate) ..	35,040	78,482	10,919	25,647
Kainite and other potassium fertiliser salts cwt.	116,148	171,661	14,360	22,554
Nitrate (saltpetre) ..	5,772	1,667	4,759	1,603
Sulphate	12,960	29,090	5,795	13,396
All other compounds ..	9,453	10,248	12,193	13,217
Sodium compounds—				
Carbonate, including soda crystals, soda ash and bicarbonate cwt.	5,000	201	1,195	82
Chromate and bichromate .. .. cwt.	4,133	4,465	4,588	5,100
Cyanide .. ,,	4,679	4,261	10,905	10,007
Nitrate .. .. ,,	44,280	179,212	9,841	40,928
All other compounds ..	24,618	15,195	18,464	14,444
Other chemical manufactures .. .. value	—	—	345,980	404,900
Drugs, medicines and medicinal preparations—				
Quinine and quinine salts .. oz.	105,086	38,149	9,064	3,416
Medicinal oils .. cwt.	7,888	4,447	23,078	11,008
Proprietary medicines value	—	—	50,307	88,395
All other sorts .. ,,	—	—	42,507	48,930
Finished dye-stuffs obtained from coal tar cwt.	4,600	3,569	130,151	119,695
Extracts for dyeing ..	6,460	3,299	12,692	6,544
Extracts for tanning (solid or liquid)—				
Chestnut .. cwt.	32,115	28,842	21,626	18,361
Quebracho	32,111	13,708	30,083	12,411
All other sorts	38,953	26,156	28,179	22,081
All other dyes and dyestuffs .. .. cwt.	541	1,304	11,802	27,790
Painters' and printers' colours and materials—				
White lead (basic carbonate) .. cwt.	7,335	6,942	10,842	9,501
Lithopone .. ,,	22,269	27,673	14,187	16,946
Ochres and earth colours cwt.	41,238	91,457	13,562	21,924
Bronze powders ,,	2,411	1,272	17,268	10,012
Carbon blacks .. ,,	39,336	30,278	56,646	38,637
Other pigments and extenders .. cwt.	48,431	39,018	11,269	9,467
All other descriptions ,,	16,404	11,107	36,243	28,808
Total .. .. value	—	—	1,119,313	1,169,295

Exports

	Quantities. March 31, 1937.	Quantities. March 31, 1938.	Value. March 31, 1937.	Value. March 31, 1938.
Acids—				
Citric .. .. cwt.	2,082	2,370	9,353	10,106
All other sorts .. value	—	—	21,951	29,051
Aluminium compounds tons	2,886	2,326	27,973	25,515
Ammonium compounds—				
Sulphate .. tons	20,611	33,469	127,391	215,793
All other sorts	1,048	640	13,198	11,360
Bleaching materials—				
Bleaching powder (chloride of lime) .. cwt.	51,790	51,865	14,164	14,700
All other sorts	6,442	2,870	17,536	7,648
Coal tar products—				
Cresylic acid .. galls.	252,372	175,710	40,704	28,673
Tar oil creosote oil ,,	3,357,752	2,940,253	88,822	77,127
All other sorts .. value	—	—	23,397	22,063
Copper, sulphate of tons	3,602	4,606	71,860	78,595
Disinfectants, insecticides, etc. .. .. cwt.	31,830	28,647	65,446	60,018
Fertilisers, manufactured tons	39,911	16,123	97,792	65,646
Glycerine .. .. cwt.	22,597	11,926	79,645	46,266
Lead compounds	17,956	14,761	30,037	20,269
Magnesium compounds tons	474	400	10,942	10,296
Potassium compounds cwt.	7 036	5,902	12,547	8,275
Salt (sodium chloride) tons	18,747	16,240	60,121	49,636
Sodium compounds—				
Carbonate, including soda crystals, soda ash and bicarbonate cwt.	441,721	333,503	83,005	84,428
Caustic .. .. ,,	168,545	135,170	74,759	73,818
Nitrate .. .. ,,	931	952	356	471
Sulphate, including saltcake .. cwt.	19,384	12,568	2,267	2,072
All other sorts	74,654	67,320	75,979	92,814
Zinc oxide .. tons	1,269	1,109	27,753	21,515
All other descriptions value	—	—	219,463	197,723
Drugs, medicines and medicinal preparations—				
Quinine and quinine salts oz.	195,632	130,516	16,796	13,970
Proprietary medicines value	—	—	147,030	111,679
All other descriptions value	—	—	139,773	144,188
Dyes and dye-stuffs and extracts for tanning—				
Finished dye-stuffs obtained from coal tar—				
Alizarine, alizarine red and indigo (synthetic) cwt.	2,493	1,361	13,635	9,259
Other sorts	8,498	5,988	116,364	100,144
Extracts for tanning (solid or liquid) cwt.	26,772	14,572	22,185	14,215
All other descriptions ,,	2,450	1,937	12,468	7,526
Painters' and printers' colours and materials—				
Ochres and earth colours cwt.	15,970	9,722	15,610	9,249
Other descriptions ..	22,436	15,766	33,709	30,482
White lead	5,330	3,144	12,625	6,627
Ships bottom compositions .. .. cwt.	4,713	2,927	17,045	9,693
Paints and painters' enamels, ready-mixed cwt.	52,341	43,393	132,891	124,812
Varnish and lacquer (clear) .. galls.	76,365	77,079	29,123	32,253
Printers' ink .. cwt.	3,961	4,323	26,339	24,777
All other descriptions cwt.	48,669	37,956	92,090	76,614
Total .. .. value	—	—	2,124,144	1,969,366

Re-Exports

	Quantities. March 31, 1937.	Quantities. March 31, 1938.	Value. March 31, 1937.	Value. March 31, 1938.
Chemical manufactures and products .. value	—	—	20,130	16,816
Drugs, medicines and medicinal preparations value	—	—	13,270	11,413
Dyes and dye-stuffs and extracts for tanning cwt.	4,467	198	5,383	932
Painters' and printers' colours and materials cwt.	612	709	1,121	1,689
Total .. .. value	—	—	39,904	30,850

References to Current Literature

Inorganic

Absorption of carbon monoxide and oxygen in ammoniacal copper carbonate solutions. Leschewski and Tolkmitt, *Z. anorg. Chem.*, *235*, 369-406.

Iodine. Masson, *Proc. Roy. Inst.*, *30*, 99-122.

Electrolytic purification of water. Elliott, *J. Australian Chem. Inst.*, *5*, 77-88.

Alkali phosphates as soap substitutes. Möllering, *Chem. Ztg.*, *62*, 228.

Working up crude phosphates by fusing with alkali silicate. Messerschmitt, *Angew. Chem.*, *51*, 197-203.

Ripening of photographic emulsions. Wada, *J. Soc. Chem. Ind. Japan*, *41*, 37-39B.

Luminescent compounds. Ryde, *Chem. Trade J.*, *102*, 309.

Organic

Ethers of glycol and polyglycol and their applications. Frydlender, *Rev. Prod. Chim.*, *41*, 97-102.

Reducing properties of various phenols. Matiu and Popescu, *J. Pharm. Chim.*, *27*, 193-203.

Oxidation of carbon. Khaikina, *Acta Physicochim.*, *8*, 343-356.

Synthesis of oxyanthraquinone salts. Flumiani and Bajic, *Monatshefte f. Chem.*, *71*, 293-297.

Higher fatty alcohols by hydrogenating copper soaps under pressure. Ueno and Komatsu, *J. Soc. Chem. Ind. Japan*, *41*, 62-63B.

Alkaloids. Manske, *Canadian Chem.*, *22*, 72-73, 75.

Analysis

Determination of cerium as oxalate. Atanesiu, *Z. analyt. Chem.*, *112*, 15-18.

Potentiometric titration in non-aqueous solutions. Ruchle, *Ind. Eng. Chem. anal. ed.*, *10*, 130-132.

Platinised silica gel as catalyst for gas analysis. Kobe and Barnet, *Ind. Eng. Chem. anal. ed.*, *10*, 139-140.

Determination of nitroglycerin. Shankster and Wilde, *J. Soc. Chem. Ind.*, *57*, 91-92.

Rapid colorimetric determination of arsenic. Gaudy and Antola, *J. Pharm. Chim.*, *27*, 165-170.

Determination of mercury. Stock and Neuenschander-Lemmer, *Ber.*, *71*, 550-562.

Salts of complex cations and the microscopic detection of anions. Yanowski and Hynes, *Mikrochem.*, *24*, 1-3.

Dry combustion method for carbon. Schmitt and Niederl, *Mikrochem.*, *24*, 59-64.

Volumetric analysis of copper. Sujita and Yamamoto, *J. Soc. Chem. Ind. Japan*, *41*, 34B.

Detection of hydrogen sulphide. Kraus, *Z. analyt. Chem.*, *112*, 1-6.

Mineral Oils, Gas, Tar

Aniline in the testing of petroleum. Trusty, *Refiner*, *17*, No. 3, 101-103.

Bauxite as adsorbent for percolation filtration. Hubbell and Ferguson, *Refiner*, *17*, No. 3, 104-108.

Determining the ageing tendencies of lubricating oils. Seufert, *Oel u. Kohle*, *14*, 239-241.

Production of oils from high temperature carbonisation processes. Greenfield, *Coal Carbonisation*, *4*, 56-62.

Watergas reaction with an iron catalyst. Dochleman, *Z. Elektrochem.*, *44*, 178-183.

Purification of the gases for the benzine synthesis. Tsuneoka and Funasaka, *J. Soc. Ind. Japan*, *41*, 43-51B.

Structure of asphalts. Traxler and Coombs, *Ind. Eng. Chem.*, *30*, 440-443.

Cellulose, Paper

Working up waste paper. *Woch. f. Papierfabrik*, *69*, 235-236.

Bleaching of celluloses. Elms, *Rev. Générale Matières Plastiques*, *14*, 37-41.

Properties of cellulose derivatives. Bluma, *Rev. Générale Matières Plastiques*, *14*, 42-46.

Action of ozone on cellulose and modified cellulose. Doree and Healey, *J. Text. Inst.*, *29*, 27-42.

Pigmentary dye-stuffs for paper. Keaton, *Paper Maker*, *95*, 57-64.

Obtaining cellulose from lignite. Beyschlag, *Papier Fabrik (techn. Teil)*, *36*, 105-108.

Bleaching, Dyeing, Finishing

Alizarin red dyeing. Haller, *Helv. Chim. Acta*, *21*, 302-308.

Oil oxidation in the textile industry. Garner, *Dyer*, *79*, 303-305.

Colour measurement and fastness tests. Godlove, *Amer. Dyestuff Reporter*, *27*, 148-156.

Auxiliaries from sulphonated fatty alcohols. *Silk and Rayon*, *12*, 372-374.

Soap in processing. Hackett, *Canadian Text. J.*, *55*, No. 6, 40-41.

Analysis of mixtures of cotton and regenerated cellulose rayon. Howlett and Urquart, *J. Text. Inst.*, *29*, 43-54.

Glass, Ceramics

Adherence of aluminium to glass. Long, *J. Soc. Glass Techn.*, *21*, 428-435T.

Nature of glass. Stanworth, *J. Soc. Glass Techn.*, *21*, 442-449T.

Metals, Electrometallurgy

Anodizing technique. Henley, *Light Metal*, *1*, 71-73, 90-92.

Rochelle salt copper plating bath. Graham and Read, *Metal Ind. (U.S.A.)*, *36*, 120-124.

Purification of aluminium. Siedentopf, *Aluminium (Germany)*, 1938, No. 2, 71-73.

Surface treatment of zinc and zinc alloys. *Metallwaren Ind. u. Galvano-Techn.*, *33*, 151-153.

Corrosion research and prevention. Schikorr, *Chem. Fabrik*, *11*, 157-159.

Corrosion of platinum implements. Bauer, *Chem. Ztg.*, *62*, 257-260.

Fats, Oils, Waxes

Determining the ash of fatty oils. *Matières Grasses Pétrole et Dérivés*, *30*, 75.

Manufacture of textile soaps. *Canadian Text. J.*, *55*, No. 6, 39-40.

Gelation of tung oil. Tatimori, *J. Soc. Chem. Ind. Japan*, *41*, 39-41B.

Recovery of glycerin. Webb, *Soap Perfum. Cosmetics*, *11*, 322-324.

Paints, Pigments, Resins

Binding agents for bronzes. Stock, *Farben Ztg.*, *43*, 333.

Manufacture of white pigments. Meyer, *Farbe u. Lack*, 1938, 103-104, 116-117.

Stability of oil colour pigments in hydrocarbon media. Chomikowsky and Rehbinder, *Acta Physicochim.*, *8*, 290-308.

Stripping of paints, varnishes, lacquers and enamels. Frydlender, *Rev. Prod. Chim.*, *41*, 129-135.

Chemical nature of shellac. Barnes, *Ind. Eng. Chem.*, *30*, 449-450.

Rubber, Plastics

Thermal polymerisation of styrol. Breitenbach, *Monatsh. f. Chem.*, *71*, 275-292.

Sorption of water by rubber. Taylor and Kemp, *Ind. Eng. Chem.*, *30*, 409-414.

Protein plastics from soybean products. Beckel, Brother, and McKinney, *Ind. Eng. Chem.*, *30*, 436,439.

Formation of substances resembling factis from sulphur-containing fatty acids. Baltes, *Kautschuk*, *14*, 45-48.

Latex in the rubber industry. Stern, *Rubber Age*, *19*, 43-47.

Synthetic rubbers. Jacobs, *Rev. Générale Caoutchouc*, *15*, No. 139, 43.

Miscellaneous

Catalysts in heterogeneous reactions. Wagner and Hauffe, *Z. Elektrochem.*, *44*, 172-178.

Physico-chemical basis of thermal separation processes. Euchen, *Osterreichische Chem. Ztg.*, *41*, 137-145.

Personal Notes

MR. DONALD EDWARD UTTLEY, who is in control of M. Uttley and Co., chemical manufacturers, Littleborough, Lancashire, has been elected to the Littleborough District Council.

The late MR JOHN HOPKINS, of Cricklewood, one of the original directors of United Dairies, Ltd., and a director of the Paper Cap Manufacturing Co., left estate valued £68,140, with net personalty £46,532.

LORD MELCHETT, who has been ordered abroad by his doctor, has resigned his directorship of Amalgamated Anthracite Collieries, Ltd.

MR. ARTHUR SUGDEN, secretary of Boots Pure Drug Co., Ltd., and a member of the statutory committee of the Pharmaceutical Society, has been appointed a Justice of the Peace for the County of London.

COLONEL and MRS. PUNTAN, of Durban, who recently celebrated their golden wedding, are natives of Banffshire. Colonel Puntan was burgh analyst at Durban for many years, and retired about twenty years ago. He is a director of the Natal Chemical Syndicate.

MR. F. G. CLAVERING FISON, chairman of Fison, Packard and Prentice, Ltd., chemical fertiliser manufacturers, Ipswich, and former M.P. for the Woodbridge Division of Suffolk, has been recommended by the executive committee of the Ipswich Conservative Association as the National Government candidate for the borough at the next election.

DR. A. E. DUNSTAN, chief chemist of the Anglo-Iranian Oil Co., Ltd., has been awarded the Redwood medal of the Institution of Petroleum Technologists in recognition of his distinguished services to the science and technology of petroleum. The presentation of the medal was made by the president, Lieutenant-Colonel S. J. M. Auld, at a meeting of the institution in London, on April 12.

MR. T. TYRIE, B.Sc., has been appointed superintendent of the Falkirk Technical Institute, in succession to Mr. H. Cowan, B.Sc. After several years' experience in the laboratories and foundries of Glenfield and Kennedy, Ltd., hydraulic engineers, Kilmarnock, Mr. Tyrie has, for the past three years, been in charge of the technical side of the foundries and enamelling shops of Walter Macfarlane and Co., Ltd., Saracen Foundry, Glasgow.

MR. E. B. NAYLOR, M.Sc., F.I.C., is retiring at the end of this session from his position as head of the chemistry department, Wigan Technical College, a post which he had held for almost 33 years. Dr. Tom Heap, M.Sc., A.I.C., will be Mr. Naylor's successor, and will take up his duties at the College in September next. Dr. Heap is a lecturer in chemistry at Battersea Polytechnic, London, a post to which he was appointed in 1929.

PROFESSOR BERNARD MOUAT JONES, principal of the Manchester College of Technology, who has recently been appointed to the Vice-Chancellorship of Leeds University, in succession to Sir James Baillie, who retires in September next, is a Londoner by birth and 56 years of age. He had a distinguished educational career, which commenced at Dulwich School and continued at Balliol College, Oxford. In 1905, he was appointed research assistant in mineralogical chemistry at the Imperial Institute, London. In 1906 he became professor of chemistry at the Government College, Lahore, India, and in 1913 an assistant professor at the Imperial College of Science, London. During the war period he was attached to the central laboratory at General Headquarters, ultimately becoming director of the laboratory with the rank of lieut.-colonel. After the war he was appointed professor of chemistry and director of the Edward Davies laboratories at the University College of Wales, Aberystwyth, his present position at Manchester being reached in 1921. Professor Jones is a past chairman of the Association of Principals of Technical Institutions and of the Association of Technical Institutions.

The late MR. ROBERT DOWNIE BUCHANAN, of Dumbarton, glue manufacturer, left personal estate valued at £8,047.

MR. HARRY RUSSELL-SMITH, analytical chemist of the firm of Teschemacher and Smith, left estate valued at £54,550 (net personalty £43,668).

DR. HAROLD C. SMITH, lecturer in chemistry at the Polytechnic, Regent Street, has been appointed head of the chemistry department, Coventry Technical College.

MR. HAROLD CHINSWORTH STOTT, managing director of J. Chadwick and Co., Ltd., dyers and finishers, of Manchester and Oldham, left estate valued at £24,858 (net personalty £10,529).

OBITUARY

MR. JOHN RISK, of Stirling, for many years associated with the Bankier Distillery, has died, aged 82.

MR. HUGH RAMAGE, who was principal of Norwich Technical College for 26 years until his retirement in 1930, has died at Norwich, at the age of 73. He conducted notable researches on gallium.

MR. DANIEL THOMAS, director and secretary of the Amalgamated Anthracite Collieries,, died at his home in Keats Grove, N.W., on April 15, at the age of 57. He had been ill for three weeks. He entered the Admiralty in 1900, becoming private secretary to the late Lord Melchett in 1910.

MR. J. E. MARSH, F.R.S., Fellow of Merton College, Oxford, from 1906 to 1930, died at Oxford, on April 13. He was a member of the Council of the Chemical Society from 1902 to 1907. Among his publications were "Stone-decay and Prevention" (1926), and "Origins and Growth of Chemical Science" (1929).

Ten Years Back

From "The Chemical Age," April 21, 1928

The Gas Light and Coke Co. has completed the agreement with the Government by which the company is to erect a low-temperature carbonisation plant at the Richmond gasworks, which will be ready for use in a few months.

* * * *

The British Association for the Advancement of Science has been informed that the King in Council has been pleased to approve the grant of a charter to the Association in accordance with the petition made by the president, Sir Arthur Keith, and the general officers in January last.

* * * *

The Chilean Government has announced that, after examination of the production costs and prevailing conditions of the nitrate markets, it will not reduce during the years 1928 and 1929 the existing export tax. It declares that it will co-operate in the reorganisation and development of the production and sale of nitrate.

* * * *

The death occurred on April 2 of Professor Theodore William Richards, of Harvard University, U.S.A., at the age of 60. Professor Richards, who was a very eminent authority on atomic weights, had been professor of chemistry at Harvard since 1901, and director of the Wolcott Gibbs Memorial Laboratory of the University since 1912.

THE mercury compound factory of the Schiaparelli Stab. Chimici-Farmaceutici Riuniti in Italy has now been enlarged so as to be capable of a monthly output of 50 tons of sublimate, calomel, red and yellow mercuric oxide, etc. The factory has recently passed into the hands of the Montecatini concern.

From Week to Week

The Chemical Age Lawn Tennis Tournament.
Entries Close May 3.

Only ten days remain for competitors to enter for THE CHEMICAL AGE Lawn Tennis Tournament, details of which were published on April 2. Entries must be sent in by May 3 (first post). The tournament, for which there is no entrance fee, comprises men's singles and doubles, open to members of the chemical industry throughout Great Britain, either as principals or members of staffs. THE CHEMICAL AGE silver challenge cups are held by the winners for twelve months, and statuettes are presented outright to the winners and runners-up.

Immediate application should be made for full particulars and entry forms to The Editor, THE CHEMICAL AGE, Bouverie House, 154 Fleet Street, London, E.C.4. (Telephone: Central 3212).

THE STRIKE OF 1,800 EMPLOYEES at the Billingham works of Imperial Chemical Industries, Ltd., was settled last week.

A NEW FOLDER ABOUT THE EMPIRE EXHIBITION which the King is to open at Bellahouston Park, Glasgow, on May 3, has just been issued.

AN OUTBREAK OF FIRE OCCURRED at the Ruchill Oil Works, of Sandeman Bros., rosin distillers, Bilsland Drive, Glasgow. Damage was confined to several barrels of oil.

THE INTERNATIONAL STELLITE CORPORATION, of New York, has supplemented its "Hard-Facing Data Sheets" with a new folder entitled "Stelliting Steam Valves by the Oxy-Acetylene Process."

GOODLASS WALL AND LEAD INDUSTRIES, LTD., announces that the registered and transfer offices removed to Ibex House, Minories, London, E.C.3, on April 19. Their telephone number remains unchanged.

THE BRITISH CHAMBER OF COMMERCE FOR SPAIN at Barcelona, continues to function normally and the committee meets regularly. The secretary will be glad to render British trade such services as are incumbent on a Chamber of Commerce.

IN CELEBRATION OF ITS 50TH ANNIVERSARY, which takes place on April 27, the Anglo-American Oil Co., Ltd., is distributing a cash bonus totalling £120,000 to all regular employees, and to all temporary employees of twelve months or more service.

THE LONDON SECTION OF THE INSTITUTE OF CHEMISTRY has arranged a golf meeting for May 11, at Addington Palace Country Club, near Croydon. Applications should be made to the Hon. Secretary, London Section, 30 Russell Square, W.C.1, before April 30.

THE 1938 EDITION OF THE STATISTICAL YEAR BOOK of the International Tin Research and Development Council (price 6s.) contains various new tables and graphs which render the book indispensable to those who wish to keep fully informed on the tin situation.

IT IS ANTICIPATED THAT DRILLING FOR OIL will soon commence at Gunhill, near Leek, North Staffordshire. The D'Arcy Exploration Company, which has the work in hand, expects to have to drill to a depth of about five thousand feet, at a cost of about £5 a foot.

TOTAL WHALE OIL PRODUCTION in the Antarctic during the season 1937-38 amounted to 3,352,000 barrels, against 2,658,108 barrels in 1936-37. Of the 1937-38 total, Norway contributed 976,222 barrels, Great Britain 1,111,194 barrels, Germany, 560,422 barrels, Japan 388,683 barrels, United States 114,000 barrels, and Panama 116,500 barrels.

PREPARATORY WORK FOR THE EXPLOITATION of the nickel ore deposits in Kaulatunturi, in the extreme North of Finland, carried out on a large scale by the Mond Nickel Co., Ltd., which has obtained the concession for the exploitation of these deposits, will soon be concluded, after which the extraction of the nickel ore will begin. It is expected that by 1940 extraction will be carried out at the rate of 500 tons per day. After thorough investigation, the Kaulatunturi deposits are estimated to contain 3,000,000 to 4,000,000 tons of nickel ore.

THE SHIPMENTS OF CHINA CLAY for March showed considerable improvement compared with the two previous months of the present year, but the aggregate tonnage for the quarter ending March, 1938, reveals a big drop in the volume of business of over 60,000 tons. Trade, however, for the current month is showing increased activity and there are indications that a recovery has set in which will contribute to another year comparable with the last. The aggregate tonnage dealt with in March was 64,280 tons compared with 69,240 tons in March, 1937, whilst the total tonnage for the first quarter in 1938 is 161,583 tons, against 222,414 tons for the first quarter in 1937.

CROFTS (ENGINEERS), LTD., have issued a folder (3710) relating to radiation fan-cooled worm reducing gears.

THE SUPPLEMENT TO *Ciba Review*, No. 8, deals with dischargeable shades on natural silk with chlorantine fast colours.

AN AMENDMENT OF LISTS OF ARTICLES chargeable with duty under Part I of the Safeguarding of Industries Act, deletes chromium potassium sulphate from List H.

DAMAGE ESTIMATED AT BETWEEN £30,000 AND £40,000 was caused by a fire which broke out at the paper mills belonging to James Brown and Co., Ltd., at Eskmills, Penicuik, Midlothian.

SHIPMENTS OF CHROMITE during 1937 from mines in the United States were the largest since 1920, and according to the Bureau of Mines, amounted to 2,321 long tons, compared with 269 tons in 1936.

FORTY-FOUR NEW FURNACES were recently put into operation by the British Aluminium Co., Ltd., at Lochaber, Scotland. This is about one-third of the number of new furnaces which are to be started up in the completion of the factory extensions.

THE DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH have issued a report on the Little Main coal seam of Cumberland (H.M. Stationery Office, 2s.), which marks a further advance on the work of the physical and chemical survey of the national coal resources.

MANY DISTINGUISHED LEADERS of industry and commerce, including personalities in the chemical and drug industry, attended a dinner given at the Trocadero Restaurant, London, on April 7, to mark the occasion of the opening in London of McConnell's Advertising Service, Ltd., who have just attained their majority.

ELLESMERE PORT WORKS of the British Dyestuffs Corporation (I.C.I.) have been closed down for six weeks as the result of the holding up of a Chinese order due to the war in the Far East. If further business is not forthcoming by the end of that time the works may be closed indefinitely. About 100 employees have been deprived of employment.

IT IS UNDERSTOOD that Imperial Chemical Industries, Ltd., are to build a munitions factory for the Government at Merthyr Tydfil. Over £1,000,000 is expected to be spent. The new factory at Merthyr Tydfil will be somewhat similar to the one now being erected at Mossend, Lanarkshire. Another new factory will be erected at Pembrey, in addition to the T.N.T. factory already established there.

IN CONNECTION WITH THE REUNION of Austria with the German Reich, the organisers of the First Congress on the Chemistry of Wood have been entrusted with a number of urgent technical and economic problems and in view of the pressure of this work and the limited time at their disposal, it is necessary to postpone the congress arranged to be held this year together with the conference of the Department for Timber Utilisation.

AT THE ANNUAL GENERAL MEETING OF THE MANCHESTER SECTION of the Oil and Colour Chemists' Association, the following officers were elected for the ensuing year: Hon. secretary, Mr. R. Fulton; hon. treasurer, Mr. F. Sowerbutts; hon. publications sec., Mr. J. G. Vear; hon. auditors, Mr. Bowden, and Mr. Tweedie. The vacancies on the committee created by the retirement of Messrs. A. Hancock and E. J. Bond, were filled by Messrs. McQuillen and Hebbelthwaite.

New Companies Registered

Baxter Laboratories, Ltd. 339,015.—Private company. Capital, £100 in 100 ordinary shares of £1 each. To carry on the business of manufacturers of and dealers in intravenous solutions, including saline, dextrose, chemicals, gases, drugs, medicines, etc. Directors: Harry N. Falk, Hudson at Raleigh, Glenview, Illinois; Dr. Ralph Falk, John Maxwell Kennard, Guy Austen-Bolamp. Registered office: 8 New Court, Lincoln's Inn, W.C.2.

London Moulders, Ltd. 338,918.—Private company. Capital, £10,000 in 10,000 shares of £1 each. To carry on the business of producers and manufacturers, refiners, extractors, distributors, importers and exporters of and dealers in chemical products of all kinds, resins, synthetic or artificial resins, gums, enamels, cements, etc. Directors: George Spencer, Lutterworth, near Rugby; Herbert B. Spencer, Cecil J. V. Spencer, Herbert Sands, Bernard W. Steel.

John Fairbank Barnes, Ltd. 339,195. Private company. Capital £5,000 in 5,000 shares of £1 each. To carry on the business of blenders, manufacturers and importers of and dealers in oils, lubricants, greases, tallow, petrol, paraffin, benzol, motor spirits, chemicals, tar, bitumen, wax, beeswax, soap, oil and other fuels etc. The directors are: John F. Barnes, 4 Rosemont Road, Bramley, Leeds; Philip R. Barnes, William L. Barnes.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

TREATMENT OF COPPER.—Metallurgica Bresciana già Tempini. (Italy, March 25, '37.) 9052.

PRODUCTION OF INSOLUBLE INK DRIERS.—A. Minich. 9552.

MANUFACTURE OF DERIVATIVES of pregnenedione.—Naamlooze Vennootschap Organon. (Switzerland, March 29, '37.) 9396.

ELECTROLYTIC PRODUCTION OF PERSULPHURIC ACID, ETC.—Oesterreichische Chemische Werke Ges. (Austria, May 21, '37.) 9272.

MANUFACTURE OF NITRATES.—H. Pauling. (Czechoslovakia, March 27, '37.) 9086.

MANUFACTURE OF INSOLUBLE METAL HALIDES.—A. R. Powell, and L. C. Myerscough. 9292.

PROCESS FOR DESENSITISING EXPLOSIVES.—A. A. Quayle. 9510.

MANUFACTURE OF NITROCELLULOSE PRODUCTS.—F. H. Reichel, and A. E. Craver. 9053.

WATERPROOFING OF GARMENTS.—W. K. Shaw. 9665.

MANUFACTURE, ETC., OF PROTEIN MATERIALS.—Soysein Process Corporation. (United States, April 6, '37.) 9232.

MANUFACTURE OF LUBRICATING OILS.—Standard Oil Development Co. (United States, Dec. 7, '37.) 9423.

RUBBER-COMPOSITIONS.—Standard Telephones and Cables, Ltd. (United States, April 14, '37.) 9206.

MANUFACTURE OF ARTICLES from synthetic resins.—W. J. Tennant (Aktiebolaget Swedish Artid). 9263.

PRODUCTION OF MANGANESE COMPOUNDS.—A. A. Thornton (Kohle und Eisenforschung Ges.). 9576.

VULCANISATION OF RUBBER.—Wingfoot Corporation. (United States, Aug. 20, '37.) 9556.

CONVERTIBLE ESTERS.—American Cyanamid Co. (United States, April 1, '37.) 9986.

PROCESS FOR SETTING, ETC., SYNTHETIC FINISHES.—D. G. Anderson. 10368.

MANUFACTURE OF PRECIPITATED ZINC COMPOUNDS.—G. Antonoff. 9916.

MELTING OF ALUMINIUM, ETC.—Austin Motor Co., Ltd., and J. J. Sheehan. 10199.

TREATMENT OF ORGANIC MATERIALS.—J. Billing and D. R. Johnston. 10441.

MANUFACTURE, ETC., OF WATERPROOF MATERIALS.—Binny and Co. (Madras), Ltd., S. N. Haywood and H. S. Toun. 10329.

METHOD, ETC., FOR ANNEALING METAL.—H. A. Brassert and Co., Ltd. (United States, July 1, '37.) 10146.

SEPARATION OF LIQUID FROM GAS, ETC.—British Oxygen Co., Ltd., and B. J. Mead. 10377.

PRODUCTION OF SYNTHETIC RESINS.—N. A. de Bruyne Aero Research, Ltd., and De Havilland Aircraft Co., Ltd. 9941.

PRODUCTION OF DIAZOBIGUANIDES.—Calco Chemical Co., Inc. (United States, April 2, '37.) 10141.

COMMINUTION OF SOLID MATERIALS.—W. F. Carey and Imperial Chemical Industries, Ltd. 10333.

AZO DYESTUFFS.—Chemical Works, formerly Sandoz. (Switzerland, April 3, '37.) 10026.

PRODUCTION OF MOLYBDENUM-CONTAINING ALLOYS.—Climax Molybdenum Co. (United States, April 28, '37.) 9890.

PERMANENT MAGNET STEEL.—Deutsche Edelstahlwerke A.-G. (Germany, April 8, '37.) 10286.

MANUFACTURE OF CHEMICAL COMPOUNDS.—Deutsche Gold-und Silber-Scheidetanstalt vorm. Roessler. (Germany, April 1, '37.) 9906.

TREATMENT OF CELLULOSE DERIVATIVE MATERIALS.—H. Dreyfus. 9832.

PRODUCTION OF ORGANIC SUBSTANCES.—H. Dreyfus. 10031.

MANUFACTURE OF ESTERS OF UNSATURATED ACIDS.—E. I. du Pont de Nemours and Co. (United States, April 3, '37.) 10330.

MANUFACTURE OF VAT DYESTUFFS.—E. I. du Pont de Nemours and Co. (United States, April 5, '&7.) 10471

PRODUCTION OF WHITE TITANIUM DIOXIDE PIGMENTS of pre-determined subordinate tints.—E. I. du Pont de Nemours and Co. and R. M. McKinney. 10299.

MANUFACTURE OF ARTIFICIAL RESIN SHAPED BODIES.—Dynamit-Akt.-Ges. vorm. A. Nobel and Co. (Germany, April 30, '37.) 10555.

PRODUCTION OF SULPHUR FROM GASES containing sulphur dioxide. A. G. Exploration Co., Ltd., and J. W. Burland. 10416.

MANUFACTURE OF ALUMINIUM, ETC.—D. Gardner. 9878.

MANUFACTURE OF AMINO FATTY-ACID DERIVATIVES.—J. R. Geigy A.-G. 10320.

MEANS FOR ALLAYING CORROSION.—W. V. Gilbert. 10547.

DYEING-VATS, ETC.—E. V. Giles. 10063.

MANUFACTURE OF MONO-AZO-DYESTUFFS.—W. W. Groves (I. G. Farbenindustrie.) 9855.

MANUFACTURE OF PENTAMETHYLENEOXIDE COMPOUNDS, ETC.—W. W. Groves (I. G. Farbenindustrie.) 9856.

MANUFACTURE OF ALIPHATIC SULPHONIC ACIDS and esters thereof. W. W. Groves (I. G. Farbenindustrie.) 9857.

PRODUCTION OF FAST DYEINGS.—W. W. Groves (I. G. Farbenindustrie.) 10003.

MANUFACTURE OF ALKALI-METAL SALTS of monosubstituted-acetylenes.—W. W. Groves (I. G. Farbenindustrie.) 10004.

MANUFACTURE OF ACID TRIPHENYL-METHANE DYESTUFFS.—W. W. Groves (I. G. Farbenindustrie.) 10005.

MANUFACTURE OF CONDENSATION PRODUCTS.—W. W. Groves (I. G. Farbenindustrie.) 10007.

MANUFACTURE OF ACID CYAMINE DYESTUFFS.—W. W. Groves (I. G. Farbenindustrie.) 10132.

MANUFACTURE OF ALKALI METAL SALTS OF ACETYLENE.—W. W. Groves (I. G. Farbenindustrie.) 10408.

MANUFACTURE OF ADDITION COMPOUNDS OF FORMALDEHYDE on acetaldehyde, etc.—W. W. Groves (I. G. Farbenindustrie.) 10527.

ALUMINIUM ALLOYS.—H. C. Hall. 10508.

WATERY DISPERSIONS OF PARAFFIN WAX, ETC.—A. Halward and P. Murányi. 10427.

INSECTICIDES.—Hercules Powder Co. (United States, April 28, '37.) 10260.

MEANS FOR ABSORBING GASES BY THE INJECTION OF COMPOUNDS into the atmosphere.—H. Hitchen, and G. W. Chester. 10200.

PROCESS FOR THE MANUFACTURE OF PURE 4-AMINO-BENZENE-SULPHONAMIDE.—I. G. Farbenindustrie. (United States, April 3, '37.) 10324.

Specifications Open to Public Inspection

CONVERSION OF ALIPHATIC HYDROCARBONS.—Universal Oil Products Co. Sept. 30, 1936. 9398/37.

THERMAL TREATMENT OF ALUMINIUM and aluminium base alloys. Aluminium Laboratories, Ltd. Oct. 1, 1936. 17730/37.

PRODUCTION OF ANHYDROUS ALKALI METAL PEROXIDES.—Mathieson Alkali Works. Sept. 29, 1936. 23986/37.

METHOD OF AND APPARATUS FOR PRODUCING GAS and a dry residue by the reaction of a solid and a liquid.—Linde Air Products Co. Oct. 1, 1936. 24064/37.

ARTIFICIAL ZEOLITES and method of making the same.—Burgess Zeolite Co., Ltd. Sept. 30, 1936. 24147/37.

SYNTHETIC RESINOUS PRODUCTS and process for making the same. Atlas Powder Co. Oct. 1, 1936. 24488/37.

REMOVAL OF WAX and the like from liquid compounds of hydrocarbons.—Aktiebolaget Separator-Nobel. Sept. 28, 1936. 24705/37.

MANUFACTURE OF ESTERS.—Soc. of Chemical Industry in Basle. Sept. 30, 1936. 25583/37.

PROCESS FOR PRODUCING FAST DYEINGS or printings on artificial structures made from organic highly polymeric bodies.—I. G. Farbenindustrie. Sept. 30, 1936. 25712/37.

MANUFACTURE AND TREATMENT OF CELLULOSE DERIVATIVES.—British Celanese, Ltd. Sept. 30, 1936. 25724, 25725, and 25727/37.

PROCESS FOR OBTAINING SILICON from its compounds.—Pharmakon Ges. Fur Pharmezeutik und Chemie. Sept. 28, 1936. 25849/37.

METHOD OF BRIGHT-PICKLING ARTICLES OF COPPER-ZINC ALLOYS. Bergwerks Ges. G. Von Giesche's Erben. Sept. 30, 1936. 25984/37.

MANUFACTURE OF STEEL ALLOYS for permanent magnet.—Naamlooze Vennootschap Philips' Gloeilampenfabrieken. Sept. 30, 1936. 26142/37.

PROCESS FOR MANUFACTURING VISCOUS PRODUCTS suitable for lubrication.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Oct. 1, 1936. 26171/37.

METHOD OF DEACIDIFYING AND DRYING OF RETTED FLAX.—Maschinenfabrik F. Haas Kommandit Ges. Oct. 2, 1936. 26200/37.

MANUFACTURE OF COLLOIDAL UREA-ALDEHYDE CONDENSATION PRODUCTS.—Kalle and Co., A.-G. Oct. 1, 1936. 26237/37.

REMOVING ACID COMPONENTS FROM HYDROCARBONS, or derivatives thereof.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij Sept. 28, 1936. 26273-4/37.

INCREASING THE WETTING POWER OF STRONG ALKALI LYES.—M. Schwarz, F. Zschimmer, E. Zschimmer, R. Schwarz, and W. Schwarz (trading as Zschimmer and Schwarz Chemische Fabrik Dolau). Oct. 3, 1936. 26279/37.

METHODS OF PRODUCING IRON-FREE COPPER SOLUTIONS.—New Process Rayon, Inc. Oct. 3, 1936. 26364/37.

MANUFACTURE OF COMPOUNDS of the cyclopentano-polyhydrophenanthrene series.—Schering, A.-G. Sept. 29, 1936. 26389/37.

MANUFACTURE OF STABLE MIXTURES containing laevo-ascorbic acid.—Naamlooze Vennootschap Industreele Maatschappij Voorheen Noury and Van Der Lande. Oct. 1, 1936. 26531/37.

MANUFACTURE OF COMPOUNDS of the thiazolidine series.—Soc. of Chemical Industry in Basle. Oct. 2, 1936. 26617/37.

MANUFACTURE AND PRODUCTION OF METAL POWDERS for electrical and magnetic purposes.—I. G. Farbenindustrie. Oct. 3, 1936. 26630/37.

PRODUCING LUBRICATING OILS.—Ruhrchemie, A.-G. Oct. 1, 1936. 26644/37.
MANUFACTURE OF CALCIUM CYANAMIDE.—A.-G. Fur Stickstoff-Dunger. Oct. 2, 1936. 26821/37.
MANUFACTURE OF AZO-DYESTUFFS containing metal.—Soc. of Chemical Industry in Basle. Oct. 3, 1936. 26822/37.
DISTILLATION OF PULVERULENT FUEL.—J. Pintsch Kommandit-Ges. Oct. 3, 1936. 26872/37.
MANUFACTURE OF INSECTICIDAL COMPOUNDS and compositions containing them.—Imperial Chemical Industries, Ltd. Oct. 3, 1936. 26875/37.

Specifications Accepted with Dates of Application

MANUFACTURE OF CONDENSATION PRODUCTS.—I. G. Farbenindustrie.) Oct. 28, 1936. 482,120.
APPARATUS FOR REFINING AND PURIFYING USED AND DIRTY LUBRICATING OIL.—S. Bramley-Moore. June 27, 1936. 482,366.
MANUFACTURE AND PRODUCTION OF PULVERULENT SYNTHETIC TEXTILE ASSISTING AGENTS.—G. W. Johnson (I. G. Farbenindustrie). July 8, 1936. 482,367.
PROCESS FOR THE MANUFACTURE OF SULPHONIC ACID AMIDE COMPOUNDS.—A. Carpmael (I. G. Farbenindustrie.) Aug. 26, 1936. 482,576.
TREATING SYLVINITE ORES and product or products obtained thereby.—Potash Co. of America. Aug. 28, 1935. 482,579.
MANUFACTURE OF HYDROAROMATIC NITROGEN COMPOUNDS.—W. J. Tennant (Henkel and Cie, Ges.). Aug. 28, 1936. 482,580.
METHOD OF MOULDING CAPS FOR BOTTLES or like containers, of synthetic resin or like substance.—N. B. Mouldings, Ltd., and E. C. Bell. Sept. 26, 1936. 482,581.
CONVERSION OF LEUCO COMPOUNDS into their oxidised form.—G. Lord, and G. Reeves. Sept. 26, 1936. 482,582.
MANUFACTURE OF POLYMERISATION PRODUCTS.—I. G. Farbenindustrie. Sept. 28, 1935. 482,583.
STABILISATION OF POLYVINYL ETHERS.—G. W. Johnson (I. G. Farbenindustrie.) Sept. 28, 1936. 482,512.
MANUFACTURE OF POLYMERISATION PRODUCTS.—I. G. Farbenindustrie, and W. W. Groves. Sept. 29, 1936. 482,440.
SEPARATING CARBON MONOXIDE FROM INDUSTRIAL GASES.—L. Lombard-Gerin. Sept. 30, 1935. 482,654.
MANUFACTURE OF CONDENSATION PRODUCTS containing nitrogen and sulphur.—W. W. Groves (I. G. Farbenindustrie.) Sept. 30, 1936. 482,515.
CHLORINATION OF PARAFFIN WAX.—D. W. F. Hardie, and Imperial Chemical Industries, Ltd. Oct. 1, 1936. 482,658.
PROCESS FOR THE MANUFACTURE OF SHAPED CELLULOSE ARTICLES from cuprammonium cellulose solutions.—I. G. Farbenindustrie. Oct. 4, 1935. 482,664.
PROCESSES FOR THE MANUFACTURE OF AROMATIC POLYSULPHONAMIDE COMPOUNDS.—I. G. Farbenindustrie. Oct. 5, 1935. 482,524.
MANUFACTURE AND PRODUCTION OF DYESTUFFS of the phthalocyanine series.—G. W. Johnson (I. G. Farbenindustrie.) Nov. 13, 1936. 482,387.
PRODUCTION OF RUBBER COMPOSITIONS.—J. Duarry-Serra. Nov. 25, 1936. 482,577.
ELECTROLYTIC PROCESSES for the manufacture of magnesium.—D. Gardner. Dec. 3, 1936. 482,678.
PROCESSES FOR THE MANUFACTURE OF BERYLLIUM or alloys thereof.—D. Gardner. Dec. 3, 1936. 482,467.
ELECTROLYTIC PROCESSES FOR THE MANUFACTURE OF BERYLLIUM. D. Gardner. Dec. 4, 1936. 482,468.
RENDERING TEXTILE MATERIALS WATER REPELLENT.—F. F. Schwartz, and M. A. Chavannes. Dec. 19, 1935. 482,619.
TREATMENT OF BERYLLIUM ORES.—D. Gardner. Dec. 18, 1936. 482,531.
CONTINUOUS PROCESS FOR CONVERTING SAPONIFIABLE FATS INTO SOAPS and glycerin.—Procter and Gamble Co. Feb. 18, 1936. 482,535.
PREPARING A COLLOIDAL SUSPENSION OF GRAPHITE.—R. R. Ducas. Feb. 7, 1936. 482,630.
STABILISATION OF POLY-ISOBUTYLENE.—G. W. Johnson (I. G. Farbenindustrie.) Sept. 28, 1936. 482,547.
PROTECTION OF MAGNESIUM RICH ALLOYS.—High Duty Alloys, Ltd., and W. E. Prytherch. April 12, 1937. 482,689.
HEAVY-HYDROCARBON CRACKING APPARATUS.—Soc. Industrielle Hellenique Des Gazofacteurs Ber-Houdar Soc. Anon. July 25, 1936. 482,639.
PREPARATION OF β-(p-OXYPHENYL)-ISOPROPYLMETHYLAMINE.—Knoll, A.-G., Chemischer Fabriken. May 26, 1936. 482,414.
FERRO-NICKEL ALLOYS.—British Thomson-Houston Co., Ltd. June 13, 1936. 482,558.
APPARATUS FOR PROJECTING MOLTEN METAL and metal alloys.—F. P. C. Benoit. June 18, 1937. 482,692.
PROTECTING ALUMINIUM and its light alloys by electrolytic deposition.—A. G. Chaybany. July 7, 1936. 482,563.
PREPARATION OF CELLULOSE ETHERS.—Dow Chemical Co. July 30, 1936. 482,695.
MAKING ALKALI SUB-SILICATES.—Pennsylvania Salt Manufacturing Co. Sept. 17, 1936. 482,698.
MANUFACTURE OF POROUS BODIES from viscose.—Viscose Development Co., Ltd., and G. A. Fletcher. Sept. 28, 1937. 482,700.
PREPARATION OF NORMAL OLEFINES containing 1- and 2-olefines (mainly 2-olefines).—A. H. Stevens (Phillips Petroleum Co.). June 24, 1936. 482,427.
MANUFACTURE AND PRODUCTION OF AROMATIC HYDROCARBONS, in particular benzene and toluene, from mineral coals by destructive hydrogenation.—G. W. Johnson (I. G. Farbenindustrie.) Nov. 4, 1937. 482,431.
ARTICLES MOULDED FROM SYNTHETIC PLASTIC.—W. Engel. Aug. 21, 1935. 482,711.
STABILISATION OF POLY-ISOBUTYLENE.—G. W. Johnson (I. G. Farbenindustrie.) Sept. 28, 1936. 482,573.
MANUFACTURE OF POLYMERISATION PRODUCTS.—W. W. Groves (I. G. Farbenindustrie.) Sept. 28, 1936. 482,647.
MANUFACTURE OF POLYMERISATION PRODUCTS.—I. G. Farbenindustrie, and W. W. Groves. Sept. 29, 1936. 482,507.

Chemical and Allied Stocks and Shares

THE better tendency in the industrial and other sections of the Stock Exchange has made further progress this week and improvement in the volume of business has also been reported. Apart from the hope that next week's Budget speech will not announce any heavy increase in direct taxation, sentiment has benefited from the improved conditions in European political affairs. The main factor influencing markets has, however, probably been the hope that the recovery legislation of the Roosevelt administration will be successful in stimulating an upward trend in trade conditions in America, because the latter would have a beneficial influence on international trade and make for higher commodity and base metal prices.

As compared with a week ago further gains have been shown by active shares of companies identified with the chemical and kindred trades, although in numerous cases best prices touched were not held. Associated Portland Cement have been in steady request and have improved further from 81s. 3d. to 83s. 9d. Distillers were good with a rise to 100s. 3d., partly owing to the more favourable views now being entertained in regard to the Budget. Boots Pure Drug have advanced further and are 49s. 6d. at the time of writing, compared with 48s. a week ago, while there was also continued demand for Beechams Pills deferred shares in advance of the results. Timothy Whites and Taylors have risen from 26s. 3d. to 27s. 9d., while Sangers have put on 9d. to 21s. 10½d. Cerebos were firm and higher in price on the dividend announcement, while Reckitt and Sons ordinary also moved in favour of holders. Lever and Unilever were good with a rise on the week from 37s. 9d. to 39s. on expectations of a larger dividend. Imperial Smelting were in better demand around 11s. 6d., an improvement of 1s. on the week. United Glass Bottle were very firm around 51s. 3d. Fison Packard and Prentice, which are 34s. 6d., compared with 33s. 1½d. a week ago, were in request on the possibility of a larger interim dividend, although the general belief in the market is that the directors are likely to leave all question of an increase until the final payment.

Imperial Chemical were active around 33s. on annual meeting influences. British Oxygen were firm around 83s. 9d. aided by the assumption that either the forthcoming dividend will be increased or shareholders will receive a bonus of some kind. Turner and Newall were active around 84s. 4½d. and Murex rose to 87s. 6d. Courtaulds at 41s. 7½d. were relatively dull in common with other rayon shares, which have been affected by the postponement of the dividend on British Celanese first preference shares, which was unexpected in the market. British Glues and British Industrial Plastics were unchanged at 5s. 7½d. and 2s. 3d. respectively, but Erinoid improved from 3s. 6d. to 4s. 3d. Greeff Chemicals Holdings 5s. units were unchanged at 6s. 3d. as were Monsanto Chemicals 5½ per cent. preference at 22s. 6d. British Drug Houses were steady at 23s. 6d. on the past year's results. British Aluminium, which were an active feature, have risen further to 52s. 6d., while Barry and Staines improved to 38s. 3d. on the maintenance of the dividend.

Iron, steel and kindred securities were active. Stewarts and Lloyds and Hopkinsons, the dividends on which are being raised to 12½ per cent., were higher, particularly the first named, which are 40s. 3d., compared with 35s. 10½d. a week ago. Consett Iron, and Pease and Partners received attention on the possibility of larger dividend payments. On the other hand, Babcock and Wilcox have been lowered to 40s. 9d.; the market had been budgeting for more than the maintenance of this company's payment.

Leading oil shares continued to participate in the improving trend of markets as there is a disposition to take a more encouraging view of the dividend prospects, but best prices touched this week were not fully maintained.

Weekly Prices of British Chemical Products

THE general chemical market has experienced the customary period of settling down following the Easter holiday and consequently the volume of inquiry has been rather restricted during the past week. A certain amount of buying has been in evidence for materials normally enjoying a regular call, but the majority of the orders placed have been for small sized parcels for immediate or nearby requirements. There has been no important feature during the week-end, and values for general chemicals, rubber chemicals and wood distillation products remain steady and quotations are unchanged. Trade in the coal tar section has again been on the slow side. A little spot buying has been taking place in some directions, but few, if any, contract orders have been placed. Apart from a firmer tone in the quotations for cresylic acid which are well held, prices for most of the tar products are nominal and susceptible to market movements.

Price Changes

Rises: Copper Sulphate (Manchester); Citric Acid (Glasgow).

Falls: Carbolic Acid, crude, 60's; Cresylic Acid, 97/99%; Pale, 99/100%; Dark, 95%; Pyridine (Manchester).

MANCHESTER.—Business in chemicals on the Manchester market during the past week has made a quiet start after the holidays. So far new bookings have been of very little importance, though some improvement in this respect may be looked for during the next week. Deliveries against old contracts have been resumed fairly well and in the aggregate may be regarded as reasonably satisfactory. Taking the market as a whole values are on a steady basis. There are no signs of any appreciable expansion in the volume of business in tar products and at the moment both home and export buying in this department is slow. However, no further serious weakness has developed in prices.

GLASGOW.—Business in general chemicals for home trade has been rather quiet since our last report, on account of the holidays. Prices, however, continue very steady at about previous figures with quite a good undertone.

General Chemicals

ACETONE.—£45 to £47 per ton.

ACETIC ACID.—Tech, 80%, £30 5s. per ton; pure 80%, £32 5s.; tech., 40%, £15 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ALUM.—Loose lump, £8 7s. 6d. per ton d/d; GLASGOW: Ground, £10 7s. 6d. per ton; lump, £9 17s. 6d.

ALUMINIUM SULPHATE.—£7 2s. 6d. per ton d/d Lancs GLASGOW: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 1s. to 1s. 1d. per lb. d/d in cylinders. SCOTLAND: 10½d. to 1s. 0½d., containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—Grey galvanising, £19 per ton, ex wharf.

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM DICHROMATE.—8½d. per lb. d/d U.K.

ANTIMONY OXIDE.—£68 per ton.

ARSENIC.—Continental material £11 per ton c.i.f., U.K. ports; Cornish White, £12 5s. to £12 10s. per ton f.o.r., mines, according to quantity. MANCHESTER: White powdered Cornish, £16 10s. per ton, ex store.

BARIUM CHLORIDE.—£11 10s. to £12 10s. per ton in casks ex store. GLASGOW: £11 10s. per ton.

BLEACHING POWDER.—Spot, 35/37%, £9 5s. per ton in casks, special terms for contracts. SCOTLAND: £9 per ton net ex store.

BORAX COMMERCIAL.—Granulated, £16 per ton; crystal, £17; powdered, £17 10s.; extra finely powdered, £18 10s., packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Granulated, £16, crystal, £17; powdered, £17 10s. per ton in 1-cwt. bags, carriage paid.

BORIC ACID.—Commercial granulated, £28 10s. per ton; crystal, £29 10s.; powdered, £30 10s.; extra finely powdered, £32 10s. in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Crystals, £29 10s.; powdered, £30 10s. 1-cwt. bags in 1-ton lots.

CALCIUM BISULPHITE.—£6 10s. per ton f.o.r. London.

CHARCOAL, LUMP.—£6 to £6 10s. per ton, ex wharf. Granulated, £7 to £9 per ton according to grade and locality.

CHROMETAN.—Crystals, 2½d. per lb.; liquor, £19 10s. per ton d/d. station in drums. GLASGOW: 70/75% solid, £5 15s. per ton net ex store.

CHROMIC ACID.—9¾d. per lb., less 2½%; d/d U.K.

CHROMIUM OXIDE.—11d. per lb.; d/d U.K.

CITRIC ACID.—1s. 0½d. per lb. MANCHESTER: 1s. 0½d. SCOTLAND: B.P. crystals, 1s. 0½d. per lb.; less 5%, ex store.

COPPER SULPHATE.—£21 7s. 6d. per ton, less 2% in casks. MANCHESTER: £18 15s. per ton f.o.b. SCOTLAND: £19 10s. per ton, less 5%, Liverpool, in casks.

CREAM OF TARTAR.—100%, 92s. per cwt., less 2½%. GLASGOW: 99%, £4 12s. per cwt. in 5-cwt. casks.

FORMALDEHYDE.—£20-£22 per ton.

FORMIC ACID.—85%, in carboys, ton lots, £42 to £47 per ton.

GLYCERINE.—Chemically pure, double distilled, 1.260 s.g., in tins, £4 12s. 6d. to £5 12s. 6d. per cwt. according to quantity; in drums, £4 5s. 0d. to £4 17s. 6d.

HYDROCHLORIC ACID.—Spot, 5s. 6d. to 8s. carboy d/d according to purity, strength and locality.

IODINE.—Resublimed B.P., 6s. 4d. per lb. in 7 lb. lots.

LACTIC ACID.—(Not less than ton lots). Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50%, by vol., £41. One-ton lots ex works, barrels free.

LEAD ACETATE.—LONDON: White, £31 10s. ton lots; brown, £35. GLASGOW: White crystals, £32; brown, £1 per ton less. MANCHESTER: White, £32; brown, £31.

LEAD, NITRATE.—£32 per ton for 1-ton lots.

LEAD, RED.—£32 15s. 0d. 10 cwt. to 1 ton, less 2½% carriage paid. SCOTLAND: £32 per ton, less 2½% carriage paid for 2-ton lots.

LITHARGE.—SCOTLAND: Ground, £32 per ton, less 2½%, carriage paid for 2-ton lots.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—SCOTLAND: £7 10s. per ton.

MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf.

MERCURY.—Ammoniated B.P. (white precip.), lump, 5s. 10d. per lb.; powder B.P., 6s. 0d.; bichloride B.P. (corros. sub.) 5s. 1d.; powder B.P. 4s. 9d.; chloride B.P. (calomel), 5s. 10d.; red oxide cryst. (red precip.), 6s. 11d.; levig. 6s. 5d.; yellow oxide B.P. 6s. 3d.; persulphate white B.P.C., 6s. 0d.; sulphide black (hyd. sulph. cum sulph. 50%), 5s. 11d. For quantities under 112 lb., 1d. extra; under 28 lb., 5d. extra.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NITRIC ACID.—Spot, £25 to £30 per ton according to strength, quantity and destination.

OXALIC ACID.—£48 15s. to £57 10s. per ton, according to packages and position. GLASGOW: £2 9s. per cwt. in casks. MANCHESTER: £49 to £55 per ton ex store.

PARAFFIN WAX.—SCOTLAND: 3¾d. per lb.

POTASH CAUSTIC.—Solid, £35 5s to £40 per ton according to quantity, ex store; broken, £42 per ton. MANCHESTER: £38 10s.

POTASSIUM CHLORATE.—£36 7s. 6d. per ton. GLASGOW: 4½d. per lb. MANCHESTER: £37 10s. per ton.

POTASSIUM DICHROMATE.—5½d. per lb. carriage paid. SCOTLAND: 5½d. per lb., net, carriage paid.

POTASSIUM IODIDE.—B.P. 5s. 6d per lb. in 7 lb. lots.

POTASSIUM NITRATE.—Small granular crystals, £24 to £27 per ton ex store, according to quantity. GLASGOW: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9¾d. per lb. SCOTLAND: B.P. Crystals, 9¾d. MANCHESTER: B.P. 10¾d. to 1s.

POTASSIUM PRUSSIATE.—6½d. per lb. SCOTLAND: 7d. net, in casks, ex store. MANCHESTER: Yellow, 6½d.

SALAMMONIAC.—Firsts lump, spot, £42 17s. 6d. per ton, d/d address in barrels. Dog-tooth crystals, £36 per ton; fine white crystals, £18 per ton, in casks, ex store. GLASGOW: Large crystals, in casks, £37 10s.

SALT CAKE.—Unground, spot, £3 11s. per ton.

SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, 13s. 10s. per ton d/d station. SCOTLAND: Powdered 98/99%, £18 10s. in drums, £19 5s. in casks, Solid 76/77° £15 12s. 6d. in drums; 70/73%, £15 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts, 10s. per ton less.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

Sodium Acetate.—£19-£20 per ton carriage paid North. **Glasgow: £18 10s. per ton net ex store.**

Sodium Bicarbonate.—Refined spot, £10 15s. per ton d/d station in bags. **Glasgow: £13 5s. per ton in 1 cwt. kegs, £11 5s. per ton in 2-cwt. bags. Manchester: £10 10s.**

Sodium Bisulphite Powder.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.

Sodium Carbonate Monohydrate.—£20 per ton d/d in minimum ton lots in 2 cwt. free bags.

Sodium Chlorate.—£27 10s. to £32 per ton. **Glasgow: £1 11s. per cwt., minimum 3 cwt. lots.**

Sodium Dichromate.—Crystals cake and powder 4½d. per lb. net d/d U.K. with rebates for contracts. Manchester:

Sodium Chromate.—4½d. per lb. d/d U.K.

4d. per lb. **Glasgow: 4½d. net, carriage paid.**

Sodium Hyposulphite.—Pea crystals, £15 5s. per ton for 2-ton lots; commercial, £11 5s. per ton. **Manchester: Commercial, £11; photographic, £15 10s.**

Sodium Metasilicate.—£14 5s. per ton, d/d U.K. in cwt. bags.

Sodium Nitrate.—Refined, £8 per ton for 6-ton lots d/d. **Glasgow: £1 12s. 0d. per cwt. in 1-cwt. kegs, net, ex store.**

Sodium Nitrite.—£18 5s. per ton for ton lots.

Sodium Perborate.—10%, 9¾d. per lb. d/d in 1-cwt. drums.

Sodium Phosphate.—Di-sodium, £12 per ton delivered for ton lots. Tri-sodium, £15 to £16 per ton delivered per ton lots.

Sodium Prussiate.—5d. per lb. for ton lots. **Glasgow: 5d. to 5¾d. ex store. Manchester: 4½d. to 5½d.**

Sodium Silicate.—£8 2s. 6d. per ton.

Sodium Sulphate (Glauber Salts).—£3 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. **Scotland: Ground quality, £3 5s. per ton d/d. Manchester: £3 12s. 6d.**

Sodium Sulphide.—Solid 60/62%, Spot, £11 15s. per ton d/d in drums; crystals, 30/32%, £9 per ton d/d in casks. **Manchester:** Concentrated solid, 60/62%, £11; commercial, **£8 10s.**

Sodium Sulphite.—Pea crystals, spot, £14 10s. per ton d/d station in kegs.

Sulphur Precip.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.

Sulphuric Acid.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.

Tartaric Acid.—1s. 1½d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. **Manchester: 1s. 1½d. per lb. Glasgow:** 1s. 1d. per lb., 5%, ex store.

Zinc Sulphate.—Tech., £11 10s. f.o.r., in 2 cwt. bags.

Rubber Chemicals

Antimony Sulphide.—Golden, 7d. to 1s. 2d. per lb., according to quality. Crimson, 1s. 6d. to 1s. 7½d. per lb.

Arsenic Sulphide.—Yellow, 1s. 5d. to 1s. 7d. per lb.

Barytes.—£6 to £6 10s. per ton, according to quality.

Cadmium Sulphide.—6s. to 6s. 3d. per lb.

Carbon Black.—4d. per lb., ex store.

Carbon Disulphide.—£31 to £33 per ton, according to quantity, **drums extra.**

Carbon Tetrachloride.—£41 to £46 per ton, according to quantity, **drums extra.**

Chromium Oxide.—Green, 10½d. to 11d. per lb.

Diphenylguanidine.—2s. 2d. per lb.

India-rubber Substitutes.—White, 4¾d. to 5½d. per lb.; dark 4d. to 4½d. per lb.

Lamp Black.—£24 to £26 per ton del., according to quantity. **Vegetable black, £35 per ton upwards.**

Lead Hyposulphite.—9d. per lb.

Lithopone.—Spot, 30%, £16 10s. per ton, 2-ton lots d/d in bags.

Sulphur.—£9 to £9 5s. per ton. Sulphur precip. B.P., £55 to £60 per ton. Sulphur precip. comm., £50 to £55 per ton.

Sulphur Chloride.—5d. to 7d. per lb., according to quantity.

Vermilion.—Pale, or deep, 5s. per lb., 1-cwt. lots.

Zinc Sulphide.—£58 to £60 per ton in casks ex store, smaller quantities up to 1s. per lb.

Nitrogen Fertilisers

Ammonium Sulphate.—The following prices have been announced for neutral quality basis 20.6% nitrogen, in 6-ton lots delivered farmer's nearest station up to June 30, 1938: November, £7 8s.; December, £7 9s. 6d.; January, 1938, £7 11s.; February, £7 12s. 6d.; March/June, £7 14s.

Calcium Cyanamide.—The following prices are for delivery in 5-ton lots, carriage paid to any railway station in Great Britain up to June 30, 1938: November, £7 10s.; December, £7 11s. 3d.; January, 1938, £7 12s. 6d.; February, £7 13s. 9d.; March, £7 15s.; April/June, £7 16s. 3d.

Nitro Chalk.—£7 10s. 6d. per ton up to June 30, 1938.

Sodium Nitrate.—£8 per ton for delivery up to June 30, 1938.

Concentrated Complete Fertilisers.—£11 4s. to £11 13s. per ton in 6-ton lots to farmer's nearest station.

Ammonium Phosphate Fertilisers.—£10 19s. 6d. to £14 16s. 6d. per ton in 6-ton lots to farmer's nearest station.

Coal Tar Products

Benzol.—At works, crude, 9½d. to 9¾d. per gal.; standard motor, 1s. 2¾d. to 1s. 3½d.; 90%, 1s. 3¾d. to 1s. 4½d.; pure, 1s. 7¾d. to 1s. 8½d. **Glasgow:** Crude, 10d. to 10½d. per gal.; motor, 1s. 4d. to 1s. 4½d.

Carbolic Acid.—Crystals, 7¾d. to 8½d. per lb., small quantities would be dearer; Crude, 60's, 3s. 3d. to 3s. 6d.; dehydrated, 4s. 4½d. to 4s. 7½d. per gal. **Manchester:** Crystals, 7½d. per lb. f.o.b. in drums; crude, 3s. to 3s. 6d. per gal.

Creosote.—Home trade, 5½d. per gal., f.o.r. makers' works; exports, 6¾d. to 6¾d. per gal., according to grade **Manchester:** 4½d. to 5½d. **Glasgow:** B.S.I. Specification, **6d. to 6½d. per gal.; washed oil, 5d. to 5½d.; lower sp. gr. oils, 5¾d. to 6½d.**

Cresylic Acid.—97/99%, 2s. 4d. to 2s. 7d.; 99/100%, 4s. to 5s. 6d. per gal., according to specification; Pale, 99/100%, 2s. 8d. to 2s. 11d.; Dark, 95%, 2s. 2d. to 2s. 3d. per gal. **Glasgow: Pale, 99/100%,** 5s. to 5s. 6d. **per gal.; pale, 97/99%, 4s. 6d. to 4s. 10d., dark, 97/99%, 4s. 3d. to 4s. 6d.; high boiling acids, 2s. to 2s. 6d.** American specification, 3s. 9d. to 4s. **Manchester:** Pale, 99/100%, 3s.

Naphtha.—Solvent, 90/160, 1s. 6d. to 1s. 7d. per gal.; solvent, **95/160%, 1s. 7d. to 1s. 8d., naked at works; heavy 90/190%,** 1s. 1d. to 1s. 3d. per gal., naked at works, according to **quantity. Glasgow: Crude, 6½d. to 7½d. per gal.; 90%, 160, 1s. 5d. to 1s. 6d., 90%, 190, 1s. 1d. to 1s. 3d.**

Naphthalene.—Crude, whizzed or hot pressed, £5 5s. to £6 5s. per ton; purified crystals, £14 per ton in 2-cwt. bags. **London: Fire lighter quality, £5 10s. to £7 per ton. Glasgow:** Fire lighter, crude, £6 to £7 per ton (bags free). **Manchester:** Refined, £15 10s. per ton f.o.b.

Pitch.—Medium, soft, 35s. per ton, f.o.b. **Manchester:** 32s. 6d. f.o.b., East Coast. **Glasgow:** f.o.b. Glasgow, 35s. to 37s. per ton; in bulk for home trade, 35s.

Pyridine.—90/140%, 13s. 6d. to 15s. per gal.; 90/160%, 10s. 6d. to 13s. 3d. per gal.; 90/180%, 3s. 3d. to 4s. per gal. f.o.b. **Glasgow: 90% 140, 10s. to 12s. per gal.; 90% 160, 9s. to 10s.;** 90% 180, 2s. 6d. to 3s. **Manchester:** 10s. 6d. to 11s. 6d. per gal.

Toluol.—90%, 1s. 10d. per gal.; pure, 2s. 2d. **Glasgow:** 90%, 120, 1s. 10d. to 2s. 1d. per gal.

Xylol.—Commercial, 1s. 11d. to 2s. per gal.; pure, 2s. 3d. to 2s. 3½d. **Glasgow:** Commercial, 2s. to 2s. 1d. per gal.

Wood Distillation Products

Calcium Acetate.—Brown, £7 10s. to £8 per ton; grey, £9 10s. to £10. **Manchester:** Brown, £9 10s.; grey, £11 10s.

Methyl Acetone.—40.50%, £35 to £40 per ton.

Wood Creosote.—Unrefined, 4d. to 6d. per gal., according to boiling range.

Wood Naphtha, Miscible.—3s. 3d. to 3s. 6d. per gal.; solvent, **3s. 6d. to 3s. 9d. per gal.**

Wood Tar.—£2 to £8 per ton, according to quality.

Intermediates and Dyes

Aniline Oil.—Spot, 8d. per lb., drums extra, d/d buyer's works.

Aniline Salts.—Spot, 8d. per lb. d/d buyer's works, casks free.

Benzidine, HCl.—2s. 7½d. per lb., 100% as base, in casks.

Benzoic Acid, 1914 B.P. (ex toluol).—1s. 11d. per lb. d/d **buyer's works.**

m-Cresol 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.

o-Cresol 30/31° C.—6½d. to 7½d. per lb. in 1-ton lots.

p-Cresol, 34-5° C.—1s. 7d. to 1s. 8d. per lb. in ton lots.

Dichloraniline.—2s. 1½d. to 2s. 5½d. per lb.

Dimethylaniline.—Spot, 1s. 7½d. per lb., package extra.

Dinitrobenzene.—8½d. per lb.

Dinitrochlorbenzene, Solid.—£79 5s. per ton.

Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 11d.

Diphenylamine.—Spot, 2s. 2d. per lb., d/d buyer's works.

Gamma Acid, Spot, 4s. 4½d. per lb. 100% d/d buyer's works.

H Acid.—Spot, 2s. 7d. per lb.; 100% d/d buyer's works.

Naphthionic Acid.—1s. 10d. per lb.

β-Naphthol.—£97 per ton; flake, £94 8s. per ton.

α-Naphthylamine.—Lumps, 1s. 1d. per lb.

β-Naphthylamine.—Spot, 3s. per lb.; d/d buyer's works.

Neville and Winther's Acid.—Spot, 3s. 3½d. per lb. 100%.

o-Nitraniline.—4s. 3½d. per lb.

m-Nitraniline.—Spot, 2s. 10d. per lb. d/d buyer's works.

p-Nitraniline.—Spot, 1s. 10d. to 2s. 3½d. per lb. d/d buyer's works.

Nitrobenzene.—Spot, 4½d. to 5d. per lb., in 90-gal. drums, drums **extra. 1-ton lots d/d buyer's works.**

Nitronaphthalene.—10½d. per lb.; P.G., 1s. 0½d. per lb.

Sodium Naphthionate.—Spot, 1s. 11d. per lb.; 100% d/d buyer's works.

Sulphanilic Acid.—Spot, 8¾d. per lb. 100%, d/d buyer's works

o-Toluidine.—11½d. per lb., in 8/10-cwt. drums, drums extra.

p-Toluidine.—2s. per lb., in casks.

m-Xylidine Acetate.—4s. 8d. per lb., 100%.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

J. EVERSHED AND SON, LTD., Brighton, soap manufacturers, etc. (M., 23/4/38.) April 7, £4,250 (not ex.) charge, to Lloyds Bank, Ltd.; charged on 160 and 166 Arundel Street, Landport, Portsmouth. *£10,000. May 1, 1937.

JOSEPH COOK, SONS, AND CO. (1930), LTD., Washington, iron and steel manufacturers. (M., 23/4/38.) April 7, debenture to Lloyds Bank, Ltd., securing all moneys due or to become due to the Bank; general charge (except, etc.). *£17,770. January 4, 1938.

C. G. CARLISLE AND CO., LTD., Sheffield, steel manufacturers. (M., 23/4/38.) March 29, mortgage and charge, to National Provincial Bank, Ltd., securing all moneys due or to become due to the Bank; charged on 625 and 629 Penistone Road, Sheffield, also general charge. * Nil. June 18, 1936.

HARDMENT PRODUCTS, LTD., London, W.C., paint manufacturers, etc. (M., 23/4/38.) April 1, debenture to Allnatt Holding Co., Ltd., securing £157 and further advances not ex. therewith £2,000; general charge.

KLENSIT SOAP CO., LTD., Ashton-under-Lyne. (M., 23/4/38.) March 31, mortgage to Halifax Building Society, securing £240 and further advances; charged on 134 Hertford Street, Ashton-under-Lyne. * Nil. October 19, 1937.

ELECTRO-ALLOYS, LTD., London, W. (M., 23/4/38.) April 2, series of £2,000 debentures, present issue £200; general charge. * Nil. Sept. 14, 1937.

L.T.C. DISTILLATES, LTD., London, S.W., oil distillers and refiners. (M., 23/4/38.) April 4, £150,000 debenture to Low Temperature Carbonisation, Ltd.; general charge.

SILVER SPRINGS BLEACHING AND DYEING CO., LTD., Congleton. (M., 23/4/38.) April 1, £1,500 3rd debenture to R. W. Heath, Biddulph; general charge. * £19,015. August 18, 1937.

Winding-up Petition

TUDOR LABORATORIES, LTD. (W.U.P., 23/4/38.) A petition for the winding-up of this company by the High Court of Justice was on April 6, 1938, presented by Richard Egerton Gold, "Clavering," Swinley Road, Ascot, Berks, and is to be heard at the Royal Courts of Justice, Strand, London, on May 2, 1938.

Petition for the Reduction of Capital

BRITISH COAL DISTILLATION, LTD. A petition has been presented for (1) the sanctioning of a Scheme of Arrangement; (2) the confirmation of the reduction of the capital from £900,000 to £570,047, and is to be heard at the Royal Courts of Justice, Strand, London, on May 2, 1938.

Company News

John Thompson Engineering, Co., Ltd., announces a final dividend of 12½ per cent., less tax, making 17½ per cent. (same for previous period).

Newton Chambers and Co., Ltd., show a profit of £105,758 (£97,748); final dividend of 10 per cent., making 15 per cent. (same) on ordinary and preference shares; to capital sinking fund reserve £25,000 (same); forward £80,925 (£69,120).

International Aluminium Co., Ltd., show profit for 1937, after providing for amortisation, renewals and other charges, £38,868 (£37,391). To tax, £5,027 (£3,700); dividend on preference shares for six months to end-December, 1937; forward £18,858 (£17,600).

Murex, Ltd., which manufactures tungsten powder and alloy and carries on an iron foundry and electrical welding business, is maintaining its interim at 7½ per cent., less tax, on the 1,000,000 ordinary shares of £1. The dividend will be paid on May 12. Last year's interim was followed by a final of 10 per cent. and a bonus of 2½ per cent.

Timothy Whites and Taylors, Ltd., wholesale and retail chemists, etc., recommend a final dividend on the ordinary shares of 10 per cent., making 40 per cent. for the period of approximately fifteen months to December 31, 1937, which is at the rate of 31¼ per cent. per annum. For the previous twelve months ended September 26, 1936, a dividend of 30 per cent., less tax, was paid, so that the present distribution of 40 per cent. represents an increase of approximately 1¼ per cent. per annum.

Forthcoming Events

London.

April 27.—Electrodepositors' Technical Society. Northampton Polytechnic Institute, St. John Street, Clerkenwell, E.C.1. 8.15 p.m. A. W. Hothersall and C. J. Leadbeater, "Electrodeposition on Tin-Plate."

The Institution of Chemical Engineers. Joint Meeting with the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C.2. 6 p.m. Dr. H. J. T. Ellingham, "Electrolysis: Principles of Plant Design and Operation."

April 28.—The Chemical Society. Burlington House, Piccadilly, W.1. 8 p.m. Ordinary Scientific Meeting.

Institute of Fuel. Junior Institution of Engineers, 39 Victoria Street, S.W.1. 6 p.m. Robert R. Harman, "Removal of Suspended Matter from Industrial Gases."

April 29.—British Association of Chemists. London Section. Annual Meeting. Broad Street Station Restaurant. 7.15 p.m.

Chemical Engineering Group. Waldorf Hotel, Aldwych, W.C.2. 6.45 p.m. Annual General Meeting. 7.30 p.m. Annual Dinner. Dr. J. J. Mallon, "The English Point of View."

University College, Gower Street, W.C.1. 5.30 p.m. Professor Th. Svedberg, "Molecular Migration under the Influence of Centrifugal, Osmotic, and Electric Forces: The Experimental Technique."

May 2.—Society of Chemical Industry. Annual General Meeting followed by Joint Meeting with the Road and Building Materials Group. Burlington House, Piccadilly, W.1. 8 p.m. T. McLachlan, "The Decay of Building Materials through Micro-Biological Agencies."

University College, Gower Street, W.C.1. 5.30 p.m. Professor Th. Svedberg, "Molecular Migration under the Influence of Centrifugal, Osmotic and Electric Forces: Investigations on Proteins."

May 3.—Institution of Civil Engineers. Great George Street, S.W.1. 5 p.m. Presentation of Kelvin Medal. 6 p.m. Sir Frank Smith, "Disorderly Molecules, Refrigeration and Engineering." Presentation of James Alfred Ewing Medal."

University College, Gower Street, W.C.1. 5.30 p.m. Professor Th. Svedberg, "Molecular Migration under the Influence of Centrifugal, Osmotic, and Electric Forces: Investigations on other Systems."

May 4.—Society of Public Analysts. Burlington House, Piccadilly, W.1. 8 p.m. Ordinary Meeting.

The Institute of Metals. The Institution of Mechanical Engineers, Storey's Gate, Westminster, S.W.1. 8 p.m. Professor G. I. Taylor, "Plastic Strain in Metals."

Birmingham.

April 29.—The Institute of the Plastics Industry. Annual Meeting of the Section. James Watt Memorial Institute. 8 p.m. Reading of Prize Papers.

May 3.—Electrodepositors' Technical Society. James Watt Memorial Institute, Great Charles Street. 7.30 p.m. Professor G. I. Finch, "The Formation and Properties of Cathodically Sputtered Metal Films."

Cardiff.

April 29.—The Chemical Society. Joint Meeting with the Chemical and Physical Society of the University College of South Wales and Monmouthshire. Physiology Institute, Newport Road. 5.45 p.m. Professor E. K. Rideal, "Some Recent Developments in the Reactions of Surfaces."

Newcastle.

April 28.—Coke Oven Managers' Association. Professor H. L. Riley, "The Carbonisation Process."

Books Received

Index 1937. British Chemical Abstracts. Published by the Bureau of Chemical Abstracts. Pp. 823.

Organic Chemistry. By Frederick Prescott and Dudley Ridge. London: University Tutorial Press. Pp. 688. 8s. 6d.

Lubricating Oil Tests and Their Significance. Fifth revised edition. by J. E. Southcombe. London: Germ Lubricants, Ltd. Pp. 100. 3s. 6d.

The Economics of the Sulphuric Acid Industry. By Theodore J. Kreps. California: Stanford University Press. London: Humphrey Milford, Oxford University Press. Pp. 284. 23s.

Organic Chemistry. An Advanced Treatise. Edited by Henry Gilman with the assistance of an editorial board of contributors. New York: John Wiley and Sons, Inc. London: Chapman and Hall, Ltd. 2 Vols. Pp. 1890. 37s. 6d. each.